

SOURCE

1. QUANTITY

Purpose:

The purpose of this item is to ensure that the water system has a sufficient quantity of source water available to meet demand at all times.

Inspection Guidelines:

The evaluation of this item requires that the inspector determine whether or not the system has an adequate number of sources, and if the capacities of the source(s) are sufficient to meet the demand requirements of the system. In order to accomplish this, the inspector should review the system files, including complaint records, to identify past problems which might be attributed to a lack of an adequate quantity of source water. Because of the severe and widespread nature of problems caused by the lack of an adequate quantity of source water, systems with a history of such problems are generally known to Department personnel.

While the inspector could spend a great deal of time calculating system capacity and demand, the best gauge of the adequacy of the system's source water quantity is whether or not it has been forced to over-pump its wells (more than 16 hrs per day) or has run out of water during non-emergency situations. In order to determine if the system is over-pumping its wells, the inspector should add the regulated capacity of all well and compare it to the average daily usage. If the average daily usage exceeds the combined regulated capacity of the wells, then the system is likely over pumping their wells.

However, there are two instances where this evaluation cannot necessarily be based on historic observation. If a ground water system serves 50 or more taps, or serves 150 or more people, then two independent sources are required regardless of performance history. A connection to another approved water system would satisfy the intent of this requirement. The other instance is where a system with a history of satisfactory source water quantity experiences a rapid growth in their customer base. Again, Department personnel are generally aware of these areas and should reevaluate these systems periodically.

This item is closely tied to other items such as Storage Capacity (Item 23) and Adequate Pressure (Item 14) and a deficiency in this area could lead to subsequent poor ratings in these areas. The inspector should take into consideration the cumulative effect of this item on the overall survey rating. If a system routinely has low pressure problems, then an overall system evaluation should be conducted to determine the cause of the low pressures.

Evaluation Criteria:

- (N) A Not Applicable rating should not be given for this item.
- (S) If a system has an adequate quantity of source water with no history of water shortages, then a rating of **Satisfactory** should be given for this item.
- (I) If system demand is approaching the maximum capacity of the system's sources, which would lead to over pumping of the system's wells, then a **Needs Improvement** rating should be given for this item.
- (U) If a system has a history of water shortages or of low distribution system pressures caused by the lack of adequate source capacity, then an **Unsatisfactory** rating should be given for this item.

Note on Master Metered Systems: These systems are generally evaluated based on the availability of water from all sources. The amount of water available from a master meter connection may be limited by contractual agreements with the supplier or hydraulic restriction of the connection.

References:

R.61-58.2 B (1) (a): (Design Criteria)

R.61-58.2 B (1) (b): (Design Criteria)

R.61-58.7 D (11): (Operation and Maintenance Criteria)

R.61-58.7 D (12): (Operation and Maintenance Criteria)

2. PROTECTION FROM CONTAMINATION (pad, seal, casing, vent, location, etc.)

Purpose:

The purpose of this item is to ensure that all ground water sources (wells, springs, etc.) are properly protected from contamination due to surface water runoff, local ground contamination and/or contamination due to animals or insects.

Inspection Guidelines:

Location

The *State Primary Drinking Water Regulations (SPDWR)* require that each well is properly located to prevent contamination of the source, storage or distribution system. The design standards for well construction require a 100 foot pollution-free radius around a well, and that an appropriate easement or deed restriction be recorded such that the 100 foot pollution-free radius is maintained. If a pollution-free radius has been established, the inspector should verify during the survey that use of this land has not been altered to allow potential sources of contamination into the area.

However, existing wells which do not have the required 100 foot pollution-free radius must be evaluated based on their own merits. The inspector should determine the age of the well, the construction methods used and the depth of grouting. If well logs (or DHEC form 1903) are available, the inspector should ask to review them to verify well construction data. The inspector should also identify any potential sources of contamination of the well, note them on the survey report and point them out to owner during the survey. If at all possible, these potential contamination sources should be eliminated.

If potential contamination sources exist, the inspector should review the well monitoring plan to determine if the current monitoring is sufficient to detect contamination should it occur, and if not, prescribe additional self-monitoring or Department conducted monitoring to ensure that the well is protected against local pollution sources.

Well Construction

The *SPDWR* also require that the well is properly constructed and sealed to prevent contamination from surface water runoff, local surface contamination or small animals or insects. This can be accomplished by maintaining the proper casing, pad, seal and venting at the wellhead. The pad must be sufficient in size to cover the area immediately around the well and must be free of full-depth cracking which would allow the flow of surface water through the pad into the soil surrounding the well casing.

The casing should extend twelve inches (12") above the pad and should also be free of cracks. However, if the casing only extends eight inches (8") above grade, it may not be practical to ask that the casing be extended an additional four inches (4") to meet this requirement, unless there is evidence of flooding at the site. Where there is evidence of site flooding, a twelve inch (12") casing may prove to be insufficient.

Except for packer jet wells, a vent is required and must be properly screened to prevent the entrance of contaminants into the well. All other openings which allow access to the well must be properly protected (screened or caulked).

Evaluation Criteria:Location

- (N) A Not Applicable rating should be given for this item if the system does not have a well (i.e. master metered system).
- (S) Based on the information available to the inspector and after a thorough review of all past and present water quality records, the inspector may determine that the location of the well, while not the most desirable, can be rated **Satisfactory**. All wells which have and maintain a 100 foot pollution-free radius should be rated **Satisfactory**.
- (I) Generally the rating of Needs **Improvement** is not used when referring to the location of a well as it would be not be practical, or even possible, to relocate the well. However, if there is a potential contamination source located in close proximity to the well which could be readily removed, the a rating of Needs **Improvement** may be warranted.
- (U) If the inspector determines that the well is highly susceptible to a potential contamination source which cannot be removed from the proximity of the well, the this item should be rated **Unsatisfactory**.

Construction

- (N) A Not Applicable rating should be given for this item if the system does not have an independent water source (i.e. master metered system).
- (S) If all of the necessary steps have been taken to prevent source water contamination through proper construction of the well and proper maintenance of a protective measures, then this item should be marked **Satisfactory**.
- (I) If proper sanitary protection measures (i.e. vent screens, seal, etc.) are in place, but are poorly

maintained, then a Needs Improvement rating should be given.

- (U) If the site is subject to flooding above the casing height or the well pad is severely cracked or the vent is not screened or there are unprotected opening through the well seal or the top of the well casing is below grade, then this item should be marked **Unsatisfactory**.

Overall

The overall rating should reflect the lowest rating given for the categories listed above. If an **Unsatisfactory** rating is warranted for any element listed in the Inspection Guidelines, then the item should be given an overall rating of **Unsatisfactory**. An **Unsatisfactory** rating may also be given if no action has been taken to correct a rating of Needs Improvement given in a previous survey.

References:

R.61-58.2 B (3) (a): (Design Criteria) - Location

R.61-58.2 B (3) (b): (Design Criteria) - Location

R.61-58.2 B (3)(c): (Design Criteria) - Location

R.61-58.2 B (6) (d): (Design Criteria)

R.61-58.2 B (16) (a) (xiii): (Design Criteria)

R.61-58.2 C (1): (Design Criteria)

R.61-58.7 D (8): (Operation and Maintenance Criteria)

R.61-58.7 D (9): (Operation and Maintenance Criteria)

R.61-58.7 D (10): (Operation and Maintenance Criteria)

3. SECURITY (fence, lock, etc.)

Purpose:

The purpose of this item is to ensure that all ground water sources, pumps and controls are protected against vandalism, tampering or sabotage.

Inspection Guidelines:

All well sites must be secured against entrance by unauthorized persons. This may be accomplished by enclosing the well within a fenced area or lockable well house. The owner may also choose to cover the well head piping with a lockable cover. All locks protecting the well head piping or pumps controls must remain locked at all times and should be inspected during the survey. Any signs of recent vandalism should be noted and considered evidence of inadequate security.

Evaluation Criteria:

- (N) A Not Applicable rating should be given for this item if the system does not have an independent water source (i.e master metered system)
- (S) If the well head area and pump controls are properly secured either inside of a locked well house, under a locked cover, or inside of a fenced area, a rating of Satisfactory should be given for this item.
- (I) If all necessary security measures are in place, but the owner has failed to maintain those measures (i.e. locks not in locked position, fences in need of repair), then a rating of Needs Improvement should be given.
- (U) If the system does not have the required security measures in place, or if recent or continued vandalism is observed, then this item should be marked Unsatisfactory.

References:

R.61-58.2 C (1): (Design Criteria)

R.61-58.7 B (18): (Operation and Maintenance Criteria)

4. WELLHEAD PIPING (check valve, blow-off, sample tap, gate valve)**Purpose:**

The purpose of this item is to ensure that the wellhead piping is configured in such a way as to minimize the potential for contamination of the source while also providing for proper testing and control of the well.

Inspection Guidelines:Proper Order of Appurtenances

During an inspection, the inspector should observe the wellhead piping to determine if the configuration is appropriate for the type of well in use (See Appendix A for diagrams of each different type of well). In order to ensure proper control and testing and to prevent contamination of the source, the wellhead appurtenances should be configured in the following order:

- ◆ **Air/Vacuum Release Valve** - On Vertical Turbine Pumps, this should be the first appurtenance in order to allow air to escape and avoid entering the system during startup and to break the vacuum on the pump when the pump stops.
- ◆ **Check Valve** - Should be the first appurtenance after the well pump, except as noted above. This will prevent any potentially contaminated water from entering the well when the well pump is not running. Not required on jet pumps.
- ◆ **Pressure Gage** - Must be after check valve.
- ◆ **Flow Meter** - Must be after the check valve and before the blow off such that all water discharged from the well will be routed through the meter. See item # 6 for requirements for flow meters.
- ◆ **Sample Tap** - For sampling the well before any treatment; must be located down stream of the check valve
- ◆ **Blowoff** - Must be downstream of the check valve.
- ◆ **Isolation Valve** - For isolating the well from the system when the blowoff is being utilized.

- ◆ **Chemical Injection Points** - (If applicable) Must be located down stream of the check valve, flow meter and blowoff. A separate injection point shall be provided for each chemical.
- ◆ **Sample Tap** - (if applicable) For sampling treated water if treatment is added.
- ◆ **Gate Valve** - Located down stream of the previous sample tap and before any storage tank or tie to the distribution system. This gate valve may be located after the storage tank if the well is equipped with a jet pump (which could lose prime if valved off) as long as the blow-off and all sample taps are protected from cross connections.

Chemical injection points should never be buried, but rather should be enclosed in a chemical injection vault if not located inside the well house.

Protection from Freezing

The well and the wellhead piping must be properly protected from freezing where necessary. Enclosure in a pump house may be the only protection required in some instances, however, additional measures may be required. This requirement is difficult to evaluate during an inspection and would generally not effect the overall rating unless continued operational problems have been experienced due to freezing.

Sample Taps

Sampling taps shall not be of the petcock type, shall not be of the mixing type, and shall not have a screen, aerator or other such appurtenances. In order to ensure a proper sampling point for taking Total Coliform samples, it is best to use a smooth-nosed type tap without interior or exterior threads, however an existing tap with threads is still acceptable if proper precaution is taken when collecting the sample. All taps must be easily accessible and located at least 12 inches above the floor or ground level.

Evaluation Criteria:

- (N) A Not Applicable rating should be given for this item if the system does not have a well (i.e master metered system)

- (S) If the wellhead piping is configured in such a way as to minimize the potential for contamination of the source, storage and distribution system, then this item should be rated **Satisfactory**. Some measures may be taken to meet the intent of the regulations even if the wellhead piping is not exactly in the order listed.
- (I) Generally, the wellhead piping must be installed in the order shown. However, the key to rating this item is whether or not the owner makes a commitment to correct any deficiencies that exist. If the owner, once notified of the deficiency, makes a commitment to correct the wellhead piping arrangement, and the problem has not been noted on previous surveys, then a rating of **Needs Improvement** can be given. Also, if the sampling taps are simply not of the correct type, a **Needs Improvement** rating may be given.
- (U) A rating of **Unsatisfactory** should be given if the wellhead piping is not in the proper order and poses a contamination risk or hinders the proper operation or control of the well. For example, an unprotected blowoff pipe located upstream of the check valve would warrant such a rating as would the absence of a blowoff.

References:

R.61-58.2 B (16) (a) (iii): (Design Criteria) - Check Valve

R.61-58.2 B (16) (a) (iv): (Design Criteria) - Sampling Taps

R.61-58.2 B (16) (a) (ix): (Design Criteria) - Blow - off

R.61-58.2 B (16) (d): (Design Criteria) - Well head piping

R.61-58.2 C (5): (Design Criteria) - Sampling Taps

R.61-58.7 (D) (4): (Operation and Maintenance Criteria) - Well head piping

R.61-58.7 (D) (5): (Operation and Maintenance Criteria) - Check valve and blow - off

R.61-58.7 (D) (6): (Operation and Maintenance Criteria) - Freeze protection

5. PUMPS (Well pumps, controls, electrical equipment)

Purpose:

The purpose of this item is to ensure that pumping devices are properly installed and maintained to provide safe, reliable operation and to protect the source from contamination.

Inspection Guidelines:

General

Refer to Appendix B for typical drawings of each type of pump installation.

The inspector should ensure that no cross connection is made by tracing all lines that are connected to the pump or its appurtenances. If the end of the line cannot be located, then the inspector should ask questions regarding its purpose and possible cross connections. For example, if the line is supplying high pressure water to a shaft seal, then the inspector should ensure that the water source is suitable for this purpose. If the line is a drain line connected to an air release valve or other appurtenance, then the inspector should ensure that the end of the line is protected by an adequate air gap and screen.

The inspector should look for short cycling of the pump. A properly designed and operated pump or pump station will not cycle more than once every five minutes or so. If the pump seems to be short cycling, then the inspector should ask the operator for an explanation. Inadequate storage tank capacity, a water logged hydro-pneumatic tank or a faulty pressure switch could all cause the pump to short cycle.

The inspector should ask how the pump or pump station is controlled and if it can be operated manually during emergency situations. Manual operation of a system designed to run by a pressure switch or level control is only acceptable as a temporary measure in the event of equipment failure. Manual operation is also acceptable if the system was designed and permitted to operate in this manner.

Vertical Turbine Pumps

Vertical turbine pumps consist of an above ground motor and a pumping unit located inside the well, below water level. Vertical turbine pumps can be installed outdoors or inside of a building. A typical well installation would have the pump located outdoors and the well head piping and chemical feed equipment located within an adjacent building.

The inspector should examine the connection between the pump discharge head and the well casing to ensure that a flanged connection or suitable sanitary seal is used to prevent contamination from entering the well at this point. The inspector should also ensure that an air relief valve is installed in the discharge piping prior to the check valve. Refer to Item 4, Wellhead Piping for further detail.

The inspector should notice if water sprays from around the pump shaft when the pump is in operation. The point where the shaft enters the discharge head will be sealed by either a packing gland or a mechanical seal. A packing gland will be easily recognized by the two adjustment nuts located on opposite sides of the pump shaft. If an excessive amount of water is spraying from the packing gland, then the inspector should state that it needs to be adjusted or repaired. A small amount of leakage from the packing gland is normal and is necessary to keep the packing and shaft cool. On mechanical seal equipped pumps, the seal must be replaced when leakage becomes excessive. No adjustment can be made to a mechanical seal.

Submersible pumps

Submersible pumps are similar in design to vertical turbines, but have a submersible electric motor mounted directly beneath the pumping unit below the draw down water level. The well head may be located under a protective enclosure outdoors or inside of a building.

The inspector should ensure that the top of the well casing is effectively sealed against the entry of water under all conditions. There are no mechanical parts that can be visually inspected on a submersible pump.

Centrifugal and Jet Pumps

Centrifugal or jet pumps are mounted completely above ground and depend upon atmospheric or system pressure to force water into the suction side of the pump. A centrifugal or jet pump will usually be located inside of a building or pump house because the electric motors used on these pumps are typically not designed to be exposed to the elements.

The point where the pump motor's shaft enters to the pump casing will be equipped with a packing gland or mechanical seal similar to a vertical turbine pump. Refer to the preceding section on vertical turbine pumps for further detail.

Evaluation Criteria:

- (N) A rating of Not Applicable should be given for a master meter system which does not own or operate pumps.
- (S) If the system's pump(s) are installed and operated according to the Inspection Guidelines and are well maintained, then this item should be given a rating of Satisfactory.
- (I) If the system's pump(s) are installed and operated according to the Inspection Guidelines, with only minor exceptions, then this item should be given a rating of Needs Improvement. This rating should also be given if a system's pump(s) are installed and operated correctly, but are not very well maintained.
- (U) If any pump is not installed according to the above guidelines, or if a problem which may threaten the adequacy or safety of the public water supply exists, then this category should be given a rating of Unsatisfactory. An Unsatisfactory rating can also be given if the inspector feels that no action has been taken to correct previous ratings of Needs Improvement or if the condition of the pump(s) indicates a severe lack of maintenance.

References:

R.61-58.2 B (16) (a) (v): (Design Criteria)

R.61-58.2 B (16) (a) (vii): (Design Criteria)

R.61-58.2 B (16) (a) (x): (Design Criteria)

R.61-58.2 B (16) (a) (xi): (Design Criteria)

R.61-58.2 B (16) (b): (Design Criteria)

R.61-58.2 B (16)(c): (Design Criteria)

R.61-58.2 B (16) (e): (Design Criteria)

R.61-58.2 B (16) (f): (Design Criteria)

6. FLOW MEASURING DEVICE

Purpose:

The purpose of this item is to ensure that each public water supply well is equipped with an acceptable means of measuring flow. Each water system needs to accurately account for all water that is produced from each water source.

Inspection Guidelines:

The inspector should first determine whether a mechanical flow measuring device (i.e. flow meter) is required for each well. If any treatment is added, then the determination is simple; a flow meter is required for each of these wells. If treatment is not added, then the inspector must determine if there is another acceptable method for accurately measuring flow from the well. A five gallon bucket and a stop watch used in conjunction with the well's blowoff pipe, while simplistic, may be an acceptable method of flow measurement for low production wells (i.e less than 25 gpm).

There are some instances where the inspector may decide that an existing well producing greater than 25 gpm is not required to install a flow meter. While some method of measuring flow is recommended for all wells, closed systems which have an adequate quantity of water, do not add treatment, and are not subject to rapid population growth may be given exemption from this requirement at the discretion of the inspector. The most common example of this type of system would be a small trailer park which is not subject to major expansion, but which happens to have a well which can produce greater than 25 gpm. However, any expansion of the system, upgrade to the well or increase in customer complaints should trigger a reevaluation of this item.

Evaluation Criteria:

- (N) If the inspector determines that a flow measuring device is not needed for the well(s), then a Not Applicable may be given. This rating should be reevaluated during each subsequent inspection.
- (S) If each well is equipped with a flow measuring device which is in proper working order, then a rating of Satisfactory should be given.

- (I) If only some of the system's wells are equipped with flow measuring devices, while others are not, then a Needs Improvement should be given. However, the inspector may determine that all wells which need a flow measuring device have them, in which case a Needs Improvement rating may not be warranted.
- (U) If the system's well(s) does not have a required flow measuring device, then a rating of Unsatisfactory should be given.

References:

R.61-58.2 B (16) (a) (vi): (Design Criteria)

R.61-58.2 B (16) (a) (viii): (Design Criteria)

R.61-58.7 B (20): (Operation and Maintenance Criteria)

R.61-58.7 D (7): (Operation and Maintenance Criteria)

TREATMENT

7. FILTRATION

Purpose:

The purpose of this item is to determine if water filtration units (including ion exchange and reverse osmosis) are properly maintained and operated.

Inspection Guidelines:

Generally, filtration treatment for ground water systems in the state fall into two categories. The most common filtration treatment of ground water is the use of pressure filters for iron removal. In the coastal plains, membrane filtration technology is utilized for the removal of fluoride or other impurities. The use of filters on ground water alters the finished water greatly and proper operation and maintenance are extremely important.

Because most of the filtration facilities on groundwater systems are self contained units (i.e. pressure filters), the inspector will not be able to inspect the filters media. The primary items that do require inspection during the survey are the pipes, instrumentation, the external condition of the filters themselves, and the backwash system. All instrumentation on the filters should be in good repair and operational.

During the inspection of the backwash system the first item to review is the filter backwash protocol. The protocol should list the step-by-step procedure for a backwash cycle, the duration of the filter wash, and if the filter has rewash or filter-to-waste capability. The backwash determining criteria (i.e. headloss, turbidity, or filter run times) should be reviewed to make sure the filters are not being operated in a way to adversely effect water quality. Other items the inspector should discuss are whether the filters are operated on an automatic or manual backwash cycle and how the waste water is handled.

Complying with manufacturers' recommendations on filter operations is the key to maintaining and operating a contained filter unit. Because there is little to see with the contained units, the following documents require review: water quality records that show filter performance such as turbidity, particle count, iron levels; filter run times; "down time" inspections, where the filter is opened and inspected by a qualified technician; and backwash procedures. Media "recharge" is often necessary where greensand or activated carbon filters are used. Records must be maintained if media recharge is required.

For membrane filtration systems, the inspector should make sure that the units are in good physical condition. The inspector also needs to determine how the reject or waste water is handled, and whether the backwash procedures or cleaning procedures are adequate. Unfortunately, the inspector will be at a disadvantage when inspecting a membrane or reverse osmosis system for the first time due to the uniqueness of these systems and the variations in manufacturers. The inspector will have to rely on the operator and manufacturers' literature for proper operational requirements.

Evaluation Criteria:

- (N) A Not Applicable rating should be given if filtration treatment is not provided.
- (S) A Satisfactory rating should be given if the filters are operated and maintained according to manufacturers' recommendations and they provide adequate treatment of the raw water and appropriate records are maintained.
- (I) A Needs Improvement should be given if the filters are operating properly but not according to manufacturers' recommendations.
- (U) An Unsatisfactory rating should be given if the filters are not maintained, if water quality is not improved with the treatment, or if no records are kept. An Unsatisfactory rating may also be given if no action has been taken to correct a rating of Needs Improvement given in a previous survey.

References:

R.61-58.2 C (10): (Design Criteria)

R.61-58.7 B (6): (Operation and Maintenance Criteria)

R.61-58.7 B (12): (Operation and Maintenance Criteria)

R.61-58.7 B (13): (Operation and Maintenance Criteria)

R.61-58.7 B (15): (Operation and Maintenance Criteria)

R.61-58.7 B (16): (Operation and Maintenance Criteria)

R.61-58.2 (D) (1): (Design Criteria)

R.61-58.7 (D) (3): (Operation and Maintenance Criteria)

8. EQUIPMENT MAINTENANCE

Purpose:

The purpose of this item is to ensure the proper maintenance of treatment equipment necessary for the production of safe drinking water. All treatment systems must be operated and maintained in accordance with the public water system's construction and operating permits and/or any modifications subsequently approved by the Department.

Inspection Guidelines:

Manuals and Records

The inspector should ensure that written maintenance procedures are available to the personnel responsible for inspection and repair of the equipment. For single unit treatment processes, these procedures may be in the form of a manual written by the equipment manufacturer. For multiple unit treatment processes, or in cases where the manufacturer's procedures are inadequate, site specific procedures for routine inspection and maintenance of the equipment must be written.

The inspector should ask to see records of when each component is inspected for the purpose of preventive maintenance. The frequency of inspection shall be at least as often as recommended by the equipment manufacturer, or as often as necessary to maintain proper operation.

Facilities

The appearance of chemical feed equipment is often the best indication of how well it is operated and maintained. Equipment that is extremely dirty and has excessive grease or chemical caked around moving parts is probably not well maintained. However, it is not practical to keep some chemical feed equipment "spotless." When evaluating the chemical feed facilities, the inspector should consider the type of chemical that is being fed, its storage and handling characteristics and if needed repairs are affecting the safety of the public water supply and/or water system operator(s). Each component of the treatment system must be in operable condition, and repairs must be made in accordance with the construction and operating permits, unless otherwise approved by the Department.

Spare Parts/Backup Equipment

Spare parts and/or backup units must be available for all components of the treatment process which are subject to wear and damage. Any component which is critical to the safety or adequacy of the public water supply should be immediately available. Such items need to be in stock at the water

system because quick delivery of spare parts from an outside source may be unreliable. Components which are not critical to the water system do not need to be in stock, but the appropriate parts manuals must be on hand so that the equipment can be repaired in a reasonable amount of time.

Evaluation Criteria:

- (N) A rating of Not Applicable should be given to systems which do not add treatment.

Manuals and Records

- (S) If the written maintenance procedures appear to be appropriate for the complexity of the system, and all maintenance records are in order and up to date, then the manuals and records may be rated **Satisfactory**.
- (I) If written maintenance procedures are provided that do not appear to be appropriate for the complexity of the system, a rating of Needs **Improvement** should be given. If maintenance records are kept, but are out of date, a rating of Needs **Improvement** should also be given.
- (U) If written operating procedures are not provided, or if maintenance records are not kept, then a rating of **Unsatisfactory** should be given.

Facilities

- (S) If each component of the treatment system is in operable condition and appears to be properly maintained, then a rating of **Satisfactory** should be given.
- (I) If each component of the treatment system is in operable condition, but one or more components do not appear to be properly maintained, then a rating of Needs **Improvement** should be given.
- (U) If any component of the treatment system is not operable, or it is being maintained in an unsafe or unreliable manner, then a rating of **Unsatisfactory** should be given.

Spare Parts/Backup Equipment

- (S) If spare parts and/or backup units are stocked or are readily available for each component necessary for operation of the water system, and repair manuals are on hand for the remaining treatment components, then a rating of **Satisfactory** should be given.

- (I) If spare parts or backup units are stocked or are readily available for each necessary component, but no parts manuals or spare parts are on hand for other treatment components, then a rating of **Needs Improvement** should be given.
- (U) If neither spare parts nor backup units are stocked for components necessary for the operation of the water system, then a rating of **Unsatisfactory** should be given. Typically, this rating would be reserved for a circumstance where failure of a component would jeopardize the safety or reliability of the public water supply due to the lack of spare parts or backup units.

Overall Rating

The overall rating should reflect the lowest rating given for the categories listed above. If an **Unsatisfactory** rating is warranted for any element listed in the Inspection Guidelines, then the item should be given an overall rating of **Unsatisfactory**. An **Unsatisfactory** rating may also be given if no action has been taken to correct a rating of **Needs Improvement** given in a previous survey.

References:

R.61-58.2 C (7): (Design Criteria)

R.61-58.2 C (9): (Design Criteria)

R.61-58.7 B (1): (Operation and Maintenance Criteria)

R.61-58.7 B (7): (Operation and Maintenance Criteria)

R.61-58.7 B (8): (Operation and Maintenance Criteria)

9. CHEMICAL STORAGE AND HANDLING

Purpose:

The purpose of this item is to ensure that a sufficient supply of chemicals are available on-site and that these chemicals are properly stored and handled.

Inspection Guidelines:

Chemical Storage

A water system which provides chemical treatment must properly store chemicals to ensure the safety of operators and equipment, and to ensure that the chemicals are not damaged or degraded. Common chemicals used for water treatment may be stored in dry, liquid or gaseous form. The amount of chemical required for treatment will dictate how the chemicals are stored. For example, a small water system may only need to keep two 150 lb cylinders of chlorine on hand to have a minimum of a three day supply on site. However, a water system which treats more water may require several ton cylinders. The inspector should verify that at least a three day supply of chemicals is stored on-site.

All stored chemicals should remain in sealed, labeled, unopened shipping containers, unless the chemical is transferred into an approved storage unit. Each form of chemical has unique storage requirements. Dry chemicals, for example, must be stored such that they will remain dry. The inspector should determine if the storage area is subject to flooding. Dry chemicals must be rotated as new shipments are received to ensure that they are used in approximately the same order as they are received. The inspector should ask how chemicals are rotated. The inspector should also determine if adequate ventilation is provided to control dust resulting from dry chemicals.

Liquid chemicals must be stored in properly labeled single-use containers. Adequate secondary containment capable of receiving and containing spills and overflows should be provided. This is often accomplished with a raised curb, sump, or partial wall around the storage area. If more than one chemical is stored in a single containment area, the containment must be capable of holding the volume of the largest holding tank. The inspector should verify that liquid chemicals are stored in proper containers and that adequate secondary containment is provided.

Gaseous chlorine must be stored in a separate area which may be indoors or in a protected area outdoors. In either case, the inspector should verify that full and emptied gas cylinders are restrained to prevent overturning and are not exposed to direct sunlight or excessive heat. Frequently, chlorine cylinders are stored indoors in the chlorine feed room. In this situation, the room must be reasonably air tight and well lit. The inspector should verify that the room is air tight by inspecting the weather stripping around the door and the room's overall condition. The room should also have

a working manually controlled fan with louvers on the discharge side. There should also be inlet louvers located away from the outlet louvers to allow fresh air to be drawn into the room. The louvers and any doors must remain closed unless the room is occupied. The inspector should verify that the louvers are closed and that they open when the fan is turned on. Finally, a working chlorine leak detector and alarm for the protection of operators is required when gaseous chemicals are stored indoors.

When two or more chemicals are stored in close proximity, consideration must be given to the compatibility of these chemicals. For example, petroleum products and oxidants, such as diesel fuel and permanganate, should never be stored together. If these chemicals mix, a potentially explosive reaction may occur endangering operators and equipment. The table below outlines common chemicals which are incompatible.

CHEMICAL	INCOMPATIBLE MATERIALS
Calcium Hypochlorite	Activated carbon, acids, turpentine, other organic or flammable materials
Caustic	Acids, and organic chemicals
Chlorine Gas	Anhydrous ammonia, turpentine, ether, finely divided metals, hydrocarbons (i.e. benzene or methane), or other flammable materials
Hydrofluosilic Acid	Metals
Phosphoric Acid	Metals, carbonates, alkalis
Potassium Permanganate	Activated carbon, gasoline, oils, phosphorous or flammable materials
Quicklime (CaO)	Alum, ferric sulfate
Sodium Carbonate (soda ash)	Strong Acids

Chemical Handling

The inspector should ask to see written procedures for handling chemicals. This should include provisions for disposing of empty bags, drums, or barrels and for the proper transfer of dry chemicals from shipping containers to storage bins or hoppers. These procedures should minimize the exposure of operators to dust from the chemicals. There should also be a documented procedure for measuring the appropriate quantities of chemicals for feed solutions to ensure consistency.

Evaluation Criteria:Overall Rating

- (N) A Not Applicable rating should be given to systems which do not add chemical treatment.
- (S) If an adequate supply of chemicals are stored on-site, procedures for properly measuring chemicals for feed solutions are documented, and the chemicals are stored properly, a Satisfactory rating may be given.
- (I) If deficiencies which do not present an immediate risk are sited and the owner makes a commitment to correct them, a rating of Needs Improvement may be given.
- (U) An Unsatisfactory rating should be given if chemicals are stored in a manner which presents a hazard. An Unsatisfactory rating may also be given if no action has been no taken to correct a previous Needs Improvement rating.

References:

R.61-58.2 E (2) (e): (Design Criteria)- Storage of Chemicals

R.61-58.2 E (2) (h): (Design Criteria)- Handling of Chemicals

R.61-58.7 B (9) & (10): (Operation and Maintenance Criteria)

R.61-58.7 B (12): (Operation and Maintenance Criteria)

R.61-58.7 B (21): (Operation and Maintenance Criteria)

10. CHEMICAL FEED (type, feed equipment and feed rooms)**Purpose:**

The purpose of this item is to ensure that the water system's chemical feed system is properly installed, maintained, and housed to provide adequate treatment, to prevent the potential for contamination, and to provide operator and public safety.

Inspection Guidelines:

When chemicals are added to the drinking water they must be approved by the Department and be certified as meeting American National Standard Institute/National Sanitation Foundation International (ANSI/NSF) Standard 60 requirements. The inspector should check storage containers or receiving forms to verify that each chemical has been certified by NSF International or Underwriters Laboratories (UL) as meeting the requirements of ANSI/NSF Standard 60. If the storage containers or shipping forms do not bear the appropriate seal, the inspector should refer to the lists of approved chemicals published by NSF and UL. Each EQC District should receive copies of both publications. A list of common chemicals and their uses is presented in *Appendix C*.

Several feed arrangements are possible depending the chemical being fed. Regardless of the feed arrangement, all water systems must have redundant chemical feeders for critical treatment systems (i.e. necessary to protect public health). Scales or calibration columns must also be provided to ensure a consistent chemical feed rate and double check valve assemblies or air gaps on "make-up" water lines are necessary to ensure that there are no cross-connections. For chlorine gas systems a viewing window to allow the operator to view the chlorinator's operation without entering the room, and a chlorine leak detection and alarm system must also be provided.

Where chemical solution tanks are used, tank lids must be properly seated and secured to prevent contamination of the chemical solution. If dry chemicals are put into solution prior to injection, the inspector should observe the solution tank to see how much chemical has precipitated out. It is normal for some chemical precipitant to exist in the bottom of the solution tank. However, excessive buildup in the mixing tank may be a sign that the operator is adding too much chemical to the solution tank or that the mixer is not providing adequate agitation to keep the chemical in solution.

Some chemicals such as lime have a tendency to clog feed lines resulting in varying chemical concentrations in the finished water, therefore chemical feed lines must be accessible so that they may be cleaned when needed. Chemical feed lines must also be color coded and labeled properly to include the pipe contents and the direction of flow. Various color schemes are used and almost any is acceptable as long as it is consistent throughout the water system.

For ground water systems raw water quality is usually stable. As a result, chemical feed rates and finished water quality remains fairly constant. The inspector should check to see if chemical feed rates are proportional to flow by comparing chemical use records with raw water pumping rates.

Evaluation Criteria:

- (N) A Not Applicable rating should be given for this item if a water system does not add chemical treatment.
- (S) If the water system is adding approved treatment chemicals via a properly operated feed system in such a way to minimize the potential for contamination and to maximize operator and public safety, then this item should be rated Satisfactory.
- (I) If the chemical feed lines are not color coded and labeled properly or the chemical feed equipment is not well maintained, then this item should receive a Needs Improvement rating.
- (U) If the water system is adding treatment chemicals that do not meet ANSI/NSF Standard 60 requirements, if the accuracy of the chemical feed equipment is not being verified or if chemicals are stored in such a manner that allows for contamination to occur, then this item should receive an Unsatisfactory rating. An Unsatisfactory rating may also be given if no action has been taken to correct a rating of Needs Improvement given in a previous survey.

References:

R.61-58.2 E (3): (Design Criteria) - NSF Requirement

R.61-58.2 E (2) (a): (Design Criteria)

R.61-58.2 E (2) (b): (Design Criteria)

R.61-58.2 E (2) (c): (Design Criteria)

R.61-58.2 E (2) (f): (Design Criteria)

R.61-58.2 E (2) (g): (Design Criteria)

R.61-58.2 B (2) (c): (Design Criteria) - Chlorine Gas

11. CHEMICAL INJECTION POINTS

Purpose:

The purpose of this item is to confirm that chemical injection points are properly located to feed the chemical in a safe manner which does not interfere with other chemical addition.

Inspection Guidelines:

The inspector should determine if the chemical injection points are located to ensure the maximum chemical benefit with no adverse effect. The point of injection may be directly into a discharge pipe, into a mixing chamber, or into a storage tank. All chemical injection points should be labeled and should have the proper color code for the specific chemical. Because all chemical lines are chemical specific, all injection points should also be dedicated to a specific chemical. One common exception is in the case where a system feeds lime and chlorine. In this instance the operator may occasionally switch the lime feed line and chlorine feed line to help keep the lime feed lines free from excess buildup. All injection points located below-grade must be in a vault or similar structure.

When inspecting the chemical feed vault, the inspector should determine the spacing of the various chemical additions to determine if adverse chemical reactions are taking place. Of particular concern is the spacing between the lime (calcium hydroxide) feed injection point and any sodium-based compounds (i.e., sodium carbonate or sodium fluoride). The distance between these injection points should be maximized because an insoluble precipitate may form if they are added in close proximity to each other causing a build-up of precipitate in the storage facilities and increasing the usage of chemicals. Other items to look for in the vault would be:

- Protection from the weather and unauthorized entry
- Drainage to a proper receptacle if chemicals are spilled
- Containment of chemical spills if drainage is not applicable
- The need for a sump pump to handle any water if the pit is subject to flooding or holding water
- Readily accessible injection points for inspection and maintenance.
- Sample taps should be located and maintained so that a well-mixed, representative water samples can be obtained following chemical addition.

Evaluation Criteria:

- (N) A Not Applicable rating should be given for this item if the system does not add chemical treatment.
- (S) If the chemical injection point(s) are properly color coded/labeled, are protected from the weather and vandalism, are in good repair, and if the vault is properly maintained then a Satisfactory rating should be given.
- (I) If the chemical injection points are not easily accessible, not adequately color coded and labeled, or not properly protected from the weather and vandalism then a Needs Improvement rating should be given. In addition, if the chemical feed lines are damaged or the vault itself is poorly maintained, then a Needs Improvement rating should be given.
- (U) An Unsatisfactory rating should be given if the following items are noticed: there is no access to the injection points, no chemical injection points are color coded/labeled, no protection from the weather or vandalism, or the vault is in poor condition. An Unsatisfactory rating may also be given if no action has been taken to correct a rating of Needs Improvement given in a previous survey.

References:

R.61-58.2 C (5): (Design Criteria)

R.61-58.2 C (6): (Design Criteria)

R.61-58.2 E (1) (b): (Design Criteria)

R.61-58.2 E (1) (c) (iii): (Design Criteria)

R.61-58.7 B (19): (Operation and Maintenance Criteria)

DISTRIBUTION

12. WATER QUALITY

Purpose:

The purpose of this item is to ensure that a water system consistently produces water which complies with established water quality standards.

Inspection Guidelines:

Prior to the on-site inspection, the inspector should review previous monitoring results and compliance records. A listing of primary and secondary maximum contaminant levels (MCLs) for drinking water is included in Appendix D. Any primary or secondary MCL violations should be noted and should be discussed with the owner or his/her representative at the time of the survey.

In addition to providing drinking water which complies with established MCLs, it is important that water is aesthetically pleasing. Water should be relatively clear, colorless, and free of objectionable tastes and odors. It should not stain or corrode plumbing fixtures, clothes, or piping. In order to determine whether the water is acceptable to consumers, the inspector should review customer complaints. While every water system will occasionally experience a water quality problem, such as “red water” (caused by elevated iron levels), a pattern of continued complaints should result in the system being having a plan in place to reduce subsequent complaints.

The inspector may also want to perform field tests or collect samples for laboratory analysis to better evaluate water quality. In low flow areas, parameters such as pH, disinfectant residual, and total coliform will provide an indication of overall water quality. A metals analysis may be helpful in areas which experience problems due to high iron or manganese levels. If the system adds fluoride, the inspector may want to analyze for this constituent to verify that a fluoride concentration of 0.8 mg/L to 1.2 mg/L is being maintained.

Evaluation Criteria:

- (N) A Not Applicable rating should not be given for this item.
- (S) This item should be rated as Satisfactory if a system has complied with all primary and secondary MCLs and has not received an unreasonable number of customer complaints relating to water quality.

- (I) A Needs Improvement rating may be given to a system which has violated a primary or secondary MCL, but has taken steps to reduce the likelihood of any future violations. The seriousness of a violation, potential health implications, and compliance history must be taken into account when evaluating this item.
- (U) An Unsatisfactory rating may be given to a system which violates one or more primary or secondary MCLs or has a history of numerous customer complaints due to the water quality. An Unsatisfactory rating for this item would usually result in an overall Unsatisfactory rating and would generally warrant an enforcement referral.

References:

R.61-58.2 B (2): (Design Criteria)

R.61-58.5 B

R.61-58.5 D

R.61-58.5 F

R.61-58.5 H

R.61-58.5 J

R.61-58.5 L

R.61-58.5 O

R.61-58.5 S

R.61-58.5 AA

13. OPERATION AND CONTROL

Purpose:

The purpose of this item is to ensure that the distribution system is operated in a manner that provides safe, reliable drinking water to the customer. This item should serve as a general rating of overall distribution system performance and operation.

Inspection Guidelines:

The inspector should look for abnormal occurrences related to the operation of the distribution system by reviewing Department files including customer complaints concerning varying pressure, water quality, etc.. Although the distribution system may be operated in accordance with the specific requirements set forth by regulation, this in itself does not guarantee that the system is operated in a safe, reliable manner. For example, if the required 25 psi minimum (see Item 14. Adequate Pressure) is maintained, but system pressure at a given location often fluctuates over a wide range (say between 25 psi and 100 psi), then the system is probably not being operated in a reliable manner.

Some specific items which the inspector should look for include the following:

- excessive pressure fluctuations
- frequent overflow of elevated tanks (may be indicated by severe erosion near discharge or by frequent complaints from adjacent residences or businesses)
- elevated or hydro-pneumatic tanks that become stagnant due to low usage
- repeated line breaks at or near the same location that could indicate a pressure surge problem
- inadequate valves in the distribution system for isolating sections of line for leak repair and flushing

Distribution problems may be caused by either poor operational habits or inadequate design. In instances where poor operational habits or procedures can be identified, the inspector should state the problem and discuss possible solutions with the appropriate system personnel. A quick response should be expected from the system. In instances where improper or outdated design seems to be the cause, a quick resolution of the problem may not be possible. If system demand has out-paced system improvement in a given area, then the owner(s) of the water system will

need to make long term plans to correct the problem. The best solution will be to identify operational procedures which can be changed to ease the problem until more permanent improvements can be made. The inspector should consider the seriousness of the problem and the system's willingness and ability to take corrective action when rating this item.

Evaluation Criteria:

- (N) A rating of Not Applicable should not be given for this item.
- (S) If the system provides safe, reliable service to its customers and has no operational or design problems with its distribution system, then a rating of Satisfactory should be given.
- (I) If the system has minor problems with the operation or design of its distribution system and shows a willingness to correct the problem(s) in a timely manner, then a rating of Needs Improvement should be given.
- (U) If the system has problems in the operation or design of its distribution system that can affect the safety or reliability of the public water supply, then a rating of Unsatisfactory should be given. An Unsatisfactory rating may also be given if no action has been taken to correct a rating of Needs Improvement given in a previous survey.

References:

R.61-58.7 (E): (Operation and Maintenance Criteria)

14. ADEQUATE PRESSURE

Purpose:

The purpose of this item is to ensure that adequate water pressure is available to minimize the potential of contamination due to cross-connections and to reduce customer complaints.

Inspection Guidelines:

A water system must maintain adequate pressure in the distribution system. *The State Primary Drinking Water Regulations* require a minimum pressure of 25 psi be maintained at every customer's tap during peak demand periods, while 20 psi must be maintained during unusually heavy flows (i.e. fire or flushing). The inspector should verify whether adequate pressures are being maintained by reviewing system records, customer complaints, and/or by performing pressure tests.

A system which offers fire protection is required to perform flow tests on all hydrants a minimum of once every three years. Hydrant flow test records must be available during the inspection. The hydrant flow test results should indicate static pressure and residual pressure during fire flow conditions. The inspector should review these records to verify that the minimum residual pressures are being maintained during hydrant testing.

A system which does not offer fire protection, but serves more than 100 taps is required to monitor distribution system pressure annually. These records should be reviewed to verify that pressures of 25 psi or higher are being maintained. A system with fewer than 100 taps is not required to monitor system pressure. The inspector may review customer complaints to determine problem areas. If a pressure problem is suspected, system pressure may be evaluated by performing pressure tests or installing pressure recorders at critical locations in the distribution system.

Evaluation Criteria:

- (N) A Not Applicable rating should not be given for this item.
- (S) If pressures of greater than 25 psi are being maintained during peak demands and 20 psi is maintained during fire flow conditions (if applicable), then this item should be rated as Satisfactory.
- (I) A Needs Improvement rating may be given for systems with minor pressure problems which have committed to correcting them.

- (U) An Unsatisfactory rating should be given to systems which do not maintain required distribution system pressures. This would likely result in an overall Unsatisfactory rating and would generally warrant an enforcement referral.

References:

R.61-58.4 B (2) (a): (Design Criteria)

R.61-58.4 D (15) (b): (Design Criteria)

R.61-58.6 C (8): (Reports Criteria)

R.61-58.7 E (7): (Operation and Maintenance Criteria)

15. FIRE FLOW

Purpose:

The purpose of this item is to ensure that the water system can provide adequate flow to protect the integrity of their water system when fire protection is provided.

Inspection Guidelines:

Water systems should confirm their ability to provide fire protection by flow testing each fire hydrant a minimum of once every three (3) years. Often there is a joint effort with the local fire departments to conduct these flow tests. If not, the water system should inform the fire departments of their flow test results. This is usually accomplished through color coding the bonnets of hydrants (see item 17, Valve/Hydrant Maintenance).

The inspector should review the water system's flow testing records and note any substandard hydrant or areas in the distribution system that have low to moderate flows. **The minimum flow required for fire protection is 500 GPM** (the addition of 1/5 maximum instantaneous flow used for design purposes is not included here since the system is usually under normal operating conditions during the flow test). These records should include the time and date of flow test, hydrant location, size of line serving hydrant, flow result in gallons per minute (GPM), static and residual pressures, and duration of test in minutes.

The inspector should request that water system personnel randomly perform routine flow tests on any substandard hydrants. This will enable the inspector to evaluate the accuracy of the system's test results and testing equipment and observe the system's testing procedures. The inspector should also request that flow test on hydrants that he or she suspects may be substandard, such as those located in dead end areas or at higher elevations, be performed as well.

Evaluation:

- (N) A Not Applicable rating should be given for this item if a water system does not provide fire protection.
- (S) If a water system is flow testing each fire hydrant a minimum of once every three (3) years and maintaining current records, and if these records indicate that the system is producing adequate flows to protect the integrity of the water system, i.e., flows greater than 500 GPM, then this item should receive a Satisfactory rating.

- (I) If a water system has adequate flows but has let flow tests lapse past the three year period for several fire hydrants, if the flow test records do not indicate the appropriate information, or if the water system does not color code their hydrants, then this item should receive a Needs Improvement rating.
- (U) If a water system has inadequate flows or if a water system does not maintain flow test results, then this item should receive an Unsatisfactory rating. An Unsatisfactory rating may also be given if no action has been taken to correct a rating of Needs Improvement given in a previous survey.

References:

R.61-58.4 D (4) (b):(Design Criteria)

R.61-58.4 D (9) (a): (Design Criteria)

R.61-58.7 E (10): (Operation and Maintenance Criteria)

16. CROSS CONNECTION CONTROL PROGRAM

Purpose:

The purpose of this item is to ensure that the water system has a program in place to identify and eliminate cross-connections between the public water system and possible sources of contamination.

Inspection Guidelines:

There will be some difference in the complexity of cross-connection control programs for small systems and large systems. The term “small system” in this context means any system which has only residential customers, such as a trailer park or subdivision. The term “large system” is meant to include any system which has commercial or industrial customers. The Department requires that a system’s cross-connection control program to be at least as stringent as our guidelines, but the system has the authority to establish more stringent guidelines as it deems necessary.

Large Systems

When surveying a large system, the inspector should ask to see the written cross-connection program. The written program should state how the system intends to identify existing cross-connections and prevent new ones from being created. The written program should also clearly state the system’s policy for selection, installation and annual testing of Double Check Valve Assemblies (DCVA) and Reduced Pressure Backflow Preventers (RP).

The inspector should also ask to see the system’s files on testable devices (DCVAs and RPs). When examining the system’s records on testable devices, the inspector should randomly select a few files and ensure that the most recent test date is not more than one year old. The inspector should also check for easily identifiable commercial and industrial customers who should have a testable device installed. For example, if files do not exist for institutions such as carwashes, dry cleaners, shopping centers, schools and mortuaries, which typically require testable devices, then the system has probably not been thoroughly surveyed for cross-connections.

Small Systems

Small public water systems must also establish and maintain a viable cross-connection program. However, the necessity of a written program will depend upon the circumstances of the particular system. Many systems choose to protect themselves by installing a residential dual check at every service connection. This device requires no annual test, is easy to install, relatively inexpensive and is reliable. The inspector should recommend this practice to any system which does not already do so. The inspector should also ask questions

of the appropriate personnel to determine if they understand what a cross-connection is and the hazard that it can present to the system.

The benefits of a proper cross-connection control program far outweighs the required investment. The system is ultimately responsible for the safety of its customers and the protection of its distribution system from contamination. If a system requires assistance in implementing or revitalizing a cross-connection control program, the Department has a program devoted to training certified testers and offering assistance to water systems.

Evaluation Criteria:

- (N) A rating of **Not Applicable** should not be given for this item.
- (S) If the system has identified and protected all cross connections within their distribution system, and maintains records ensuring that DCVAs and RP devices are tested annually, then a rating of **Satisfactory** should be given.
- (I) If the system has a cross-connection control program in place, but does not keep adequate records or are missing some component of its program, then a rating of **Needs Improvement** should be given.
- (U) If the system does not have an adequate cross-connection control program in place, then a rating of **Unsatisfactory** should be given. An **Unsatisfactory** rating may also be given if no action has been taken to correct a rating of **Needs Improvement** given in a previous survey.

References:

R. 61-58.4 D (14): (Design Criteria)

R. 61-58.7 F: (Operation and Maintenance Criteria)

17. VALVE AND HYDRANT MAINTENANCE

Purpose:

The purpose of this item is to ensure that a systems's valves and hydrants are being maintained such that they may be located and operated as needed.

Inspection Guidelines:

Valve Maintenance

Properly operating valves are critical when a portion of the distribution system must be isolated, such as when a line break occurs. A valve maintenance program extends valve life and results in long term savings to the system. A water system must have a program for inspecting, exercising, and maintaining system valves. During the survey, the inspector should ask to see the written valve maintenance program. At a minimum the program should include the following components:

- An updated system map indicating the location and identification of all valves
- Documentation of valve type, date of last exercise, number of turns to close, and a record of maintenance work for each valve
- A schedule for regular exercise and routine maintenance
- Documentation that valves are being exercised in accordance with the valve maintenance plan and that necessary maintenance is being performed

An accurate and complete system map is essential to both the valve and hydrant maintenance programs. This map should indicate all distribution lines, line sizes, valve locations, hydrant locations and corresponding valve and hydrant numbers. The map is critical if valves are to be located in a timely manner during an emergency. The program should include a schedule for exercising valves and performing maintenance. This may simply be a statement of how often and in what order valves are to be exercised. A review of valve records will indicate whether the program is being executed according to the plan. Records of the size, type, date of last exercise, number and direction of turns to close, and maintenance work for each valve must also be maintained.

Many small systems simply devote a single page in a notebook to each valve which includes all pertinent information and a sketch of the valve location relative to intersection, hydrants, or property lines. The inspector should ask whether the records are updated as the system grows. Procedures for exercising valves and performing routine maintenance are also recommended to ensure consistency. These may include procedures for establishing traffic control, for notifying appropriate personnel if change-out is required, etc. Appendix E contains a worksheet for valve exercise and a typical valve card which may be helpful to systems working to establish a program.

Hydrant Maintenance

Properly operating hydrants are essential for fire protection and insurance purposes. In addition, a water system may be held liable if hydrants do not operate properly in emergency situations. A proper hydrant maintenance program will ensure that hydrants are operational, that adequate fire flow and pressure is available, and identify any necessary maintenance. At a minimum, a hydrant maintenance program must include the following components:

- An updated system map indicating the location and number of all hydrants
- A schedule for flow testing and performing routine maintenance
- Documentation of hydrant type, date of installation, and a record of maintenance work performed for each hydrant
- Documentation indicating that necessary maintenance is being performed

Usually the same map is used for the valve and hydrant maintenance programs. A schedule for the regular inspection and flow testing of fire hydrants is also required. See Item 17 for the requirements pertaining to the frequency and results of these tests. AWWA recommends color coding hydrant bonnets based on the available flow. The color code recommended by fire code is given in the table below.

BONNET COLOR	AVAILABLE FIRE FLOW
Black or Bagged	Out of Service Hydrants
Orange	500-1000 gpm @ 20 psi
Green	1000 - 1500 gpm @ 20 psi
Light Blue	> 1500 gpm @ 20 psi

Some systems use a different color scheme which is set forth by the local fire department. This is an acceptable alternative as long as it is consistent. As with the valve maintenance program, certain documentation is required. There should be records of hydrant type, date of installation, maintenance work, and most recent flow test results. Procedures for performing hydrant maintenance and flow tests should also be available. Appendix E contains typical procedures for performing routine hydrant maintenance and flow testing which may be helpful to systems establishing a hydrant maintenance program.

Evaluation Criteria:Overall Rating

(N) A Not Applicable rating may given to very small water systems with a limited number of valves and no hydrants.

(S) A Satisfactory rating should be given to a system without fire protection if its valve maintenance program includes the essential components listed in the inspection guidelines.

If a system offers fire protection, a Satisfactory rating should be given if the system has an acceptable valve maintenance program and has a hydrant maintenance program which includes all of the essential components listed in the inspection guidelines.

(I) A Needs Improvement rating may be given if a system is committed and actively working to establish maintenance program(s), but is missing one or more components.

(U) An Unsatisfactory rating should be given if a system has no valve and/or hydrant maintenance program(s) or the documentation exists but the program is not being executed. An Unsatisfactory rating may also be given if no action has been taken to correct a rating of Needs Improvement given in a previous survey.

References:

R.61-58.7 E (9): (Operation and Maintenance criteria)

18. FLUSHING PROGRAM

Purpose:

The purpose of this item is to ensure that the system's routine flushing program is adequate to help prevent customer complaints and water quality problems associated with stagnant, discolored, and sediment-laden water. An added benefit of an active flushing program is that it helps to maintain a disinfectant residual throughout the distribution system.

Inspection Guidelines:

There are two distinct types of flushing programs recommended for public water systems: 1) A system wide flushing, where scouring velocities are maintained to clean the water line, and 2) The low velocity flushing used to maintain chlorine residuals in the distribution system. Both of these flushing systems are important for the water system and are required by the State Primary Drinking Water Regulations. In order to determine the flow required to achieve scouring velocities for different lines sizes, refer to the chart given in Appendix A.

The first item to review in any flushing program is the map of the distribution system which is covered in Item 20 (System Map) of this manual. A second and equally important item to review is the flushing records. These records should include the date, time, location, velocities, total flushing time, size of line, length of line, flow rate, time to clear, volume of water used, chlorine residuals, and other relevant information. The inspector's review of this data is very important in determining the effectiveness of the flushing program.

Another item that the water system should maintain and use with their flushing program is past water quality reports and complaint records. These two items are good indicators of whether or not an adequate flushing program is being conducted. However, a water system should not simply flush the system as a response to water quality complaints.

Restaurants and small businesses may not be required to implement a formal flushing program. The inspector will have to use his or her own judgment when determining the need for, and adequacy of, a flushing program for these types of systems. If a system is having water quality problems, such as iron, manganese, or sediment in their finished water, or if the system allows water to sit in the line for extended periods of time with little or no usage, then a flushing program may be warranted.

Evaluation Criteria:

- (N) A Not Applicable rating should not be given for this item unless the inspector determines that a formal flushing program is not required.
- (S) If the water system has a formal, written flushing program which includes a systematic plan for flushing the entire distribution system, and maintains records that address the adequacy of the program, then the system should be given a Satisfactory rating.
- (I) If the system seems to have an adequate flushing program, but does not maintain a written plan or flushing records, then a Needs Improvement rating should be given.
- (U) If the water system does not retain flushing records, only flushes when complaints are received, or does not maintain water quality, an Unsatisfactory should be given. An Unsatisfactory rating may also be given if no action has been taken to correct a rating of Needs Improvement given in a previous survey.

References:

R.61-58.7 E (13): (Operation and Maintenance Criteria)

19. LEAK DETECTION AND REPAIR

Purpose:

The purpose of this item is to ensure that the water system is actively searching for water line leaks and using sanitary practices to repair those leaks.

Inspection Guidelines:

The inspector should determine if the water system is carrying out a leak detection and repair program on a continuous basis. Depending on the size and complexity of the water system various components of this program could include the following:

Leak Detection

Water Audit: A water audit is a comparison of the amount of water produced with the amount of finished water sold plus the amount of water used for flushing procedures, fire fighting activities, etc. Because some systems have staggered billing cycles, the consumption records may fluctuate from month to month. Therefore, an average loss should be calculated monthly over at least a one (1) year period. Keeping the average loss to no more than 10% is what water systems should strive for.

Visual Inspections: System personnel should report any leaks that are noticed during routine distribution maintenance. Low lying areas, are good places for system personnel to focus their attention on because line breaks are more apt to occur in lower areas in the distribution system where the pressure is greatest.

Audible Inspections: Listening devices can be placed on fire hydrants, valves or directly on the ground over a water line to determine if there are leaks. These devices can be as simple as a metal or wooden rod or as sophisticated as a hydro-phonic probe equipped with an amplifier. The hydro-phonic devices are not common because of their cost, but they may be beneficial in pinpointing a leak if one is known to exist. Therefore, water system may want to have an agreement with a neighboring utility or private contractor so they may lease such devices when the need arises.

Leak Repair

Leak repair procedures must be fully documented, and various methods can be approved as long as adequate disinfection is achieved. The American Water Works Association recommends that a repaired section of pipe be filled with a solution containing a chlorine residual of 200 mg/L.

This solution should be allowed to stand in the pipe for two (2) hours and then flushed out. For most water systems this method is not practical due to time constraints and system demands. An alternative method is to swab the inside of the pipe with the same chlorine solution.

The most common deficiency noted under this item is the lack of adequate record keeping. Systems will generally generate a work order for all line repairs, but the actual repair procedures are usually left off of the work order. The inspector should recommend that the leak repair form include the date the repair was made, the location of the leak, the size line repaired, the disinfection method, the flushing procedures, and the resulting chlorine residual. If performed, a copy of the bacteriological monitoring results and the estimated amount of water lost due to the leak should also be included. In conjunction with this report form, the amount of water lost due to the leak and the amount of water due to flushing should be incorporated into the water audit.

Evaluation Criteria:

- (N) A Not Applicable rating may be given to small water systems which generally experience few leaks and contract others to perform line repair.
- (S) If a water system is using appropriate methods to identify and repair leaks, and if these procedures are well documented, then this item should be rated **Satisfactory**.
- (I) If a water system is trying to identify leaks, but they do not have a written program for repairing leaks or adequate records documenting their repair procedures, then this item should receive a **Needs Improvement** rating. This item may also be rated **Needs Improvement** if the system has a good program but an unacceptably high percentage of unaccounted for water (i.e > 15%).
- (U) If a water system has an unusually high percent of water loss (greater than 25%), does not have an active leak detection program or if there is no emphasis placed on practicing sanitary procedures when repairing leaks, then this item should receive an **Unsatisfactory** rating. An **Unsatisfactory** rating may also be given if no action has been taken to correct a rating of **Needs Improvement** given in a previous survey.

References:

R.61-58.7 E (11): (Operation and Maintenance Criteria)

R.61-58.7 E (12): (Operation and Maintenance Criteria)

R.61-58.7 B (2) (j): (Operation and Maintenance Criteria)

20. SYSTEM MAP

Purpose:

Each system must have a current and accurate map of the distribution to aid in the proper operation of the public water system and to be able to respond to emergency situations.

Inspection Guidelines:

The inspector should ask to review the distribution system maps to ensure that accurate and updated information is maintained. System maps should include the following:

- all sources
- treatment plants
- storage tanks
- distribution lines with sizes
- pumping facilities
- valves
- hydrants and blow-offs

The complexity and level of detail required for the system map may vary depending on the size and type of water system. However, even for the most simple types of systems, such as a restaurant with a single service line, a sketch showing the location of service line and the shut-off valve is needed. For most community water systems, a detailed map which is drawn to scale is required. The inspector should use their best judgement to determine if the level of detail provided is adequate for the type and size of system being inspected.

Evaluation Criteria:

- (N) The Not Applicable rating should not be given for this item.
- (S) A Satisfactory rating should be given if the system map is drawn in adequate detail for the system being surveyed and includes all of the applicable elements listed.
- (I) If a system has a map of the distribution system, but it does not include the necessary components, or is not regularly updated, then a Needs Improvement rating should be given.

- (U) If a system does not maintain an adequate system map, then an **Unsatisfactory** rating should be given. An **Unsatisfactory** rating may also be given if no action has been taken to correct a rating of **Needs Improvement** given in a previous survey.

References:

R.61-58.7 E (8): (Operation & Maintenance Criteria)

21. SAMPLE SITING PLAN

Purpose:

The purpose of this item is to evaluate the system's sample siting plan to determine if it is adequate to ensure that there is no place in the distribution system where microbiological contamination could persist indefinitely with little chance of detection.

Inspection Guidelines:

One of the requirements of the Total Coliform Rule is that each public water system (community and non-community) has a written sample siting plan to follow when collecting total coliform samples from the distribution system. The inspector should review the written plan during the survey and determine if it is adequately written to allow someone with limited knowledge of the system to carry out the plan. The plan must include a map of the distribution system and a detailed description of how the sampling plan will be carried out. The distribution map must show the locations of all: distribution water lines, water sources, storage tanks and sampling points. Very small public water systems such as restaurants, convenience stores office building, etc. are not required to include a map as part of their plan.

The sample siting plan should be designed such that system coverage is accomplished with each month's samples. Systems which are required to take more than five (5) samples per month must take the samples at regular time intervals throughout the month. All major portions of the distribution system must be covered by the sampling plan. Each sample point in the plan must be sampled at least every three (3) months. The sample plan should avoid sampling points which are served by major transmission mains, and should target areas served by smaller pipes or dead end lines.

Evaluation Criteria:

- (N) A Not Applicable rating should be given for this item to non-community systems and state systems.
- (S) If the sample siting plan includes a detailed description of how the plan is carried out as well as an adequate map (if required) that identifies the required system components (i.e. tanks, valves, etc.) and all sampling points, then a Satisfactory rating should be given for this item.

- (I) If all of the elements for a proper plan are in place, but there are some elements of the plan which are missing or should be changed (i.e. no written procedure, sampling points on major transmission lines, lack of full system coverage, etc.) then a Needs **I**mprovement rating should be given, and the system should be asked to revise the plan.
- (U) If the system does not seem to have a documentable sampling procedure, a rating of **U**nsatisfactory should be given. An **U**nsatisfactory rating may also be given if no action has been taken to correct a rating of Needs **I**mprovement given in a previous survey.

References:

R.61-58.5 I(1)(a): (Total Coliform Rule Requirements)

R.61-58.7 B (2)(f): (Operation and Maintenance Criteria)

22. DISINFECTANT RESIDUAL**Purpose:**

The purpose of this item is to ensure that systems which add a disinfectant to their drinking water maintain an adequate residual at all points within the distribution system.

Inspection Guidelines:

Each public water system which adds a disinfectant to the treatment process must maintain a disinfectant residual at all points with the distribution system. The inspector should collect and analyze disinfectant residual samples in areas of the distribution system where low disinfectant residuals would be expected or have historically been found. Low disinfectant residual levels or the absence of a residual in the distribution system can lead to a number of water quality problems.

- (N) A Not Applicable rating should be given for this item if a disinfectant is not added to the water.
- (S) If adequate disinfectant residuals are maintained throughout the distribution system, then a Satisfactory rating should be given for this item.
- (I) If the system generally maintains an adequate residual at most points in the distribution system, but has isolated areas which often have very low or no disinfectant residuals, then a Needs Improvement rating may be given for this item.
- (U) If a system fails to maintain an adequate disinfectant residual in the distribution system, then an Unsatisfactory rating should be given for this item.

References:

R.61-58.2 D(2): (Design Criteria)

STORAGE

23. STORAGE CAPACITY

Purpose:

The purpose of this item is to verify that adequate finished water storage capacity is available to ensure service during emergency situations and to provide an available reserve during hours of peak usage.

Inspection Guidelines:

For Elevated Storage

According to design regulations, “Where fire flows are provided, tanks shall be sized to provide two (2) hours of supply for a combined flow of peak hour domestic plus fire flow; or, the storage capacity (or equivalent capacity) shall be equal to one-half ($\frac{1}{2}$) the maximum daily consumption, whichever is greater. Either requirement may be reduced when the source and treatment facilities have sufficient capacity with auxiliary power to supplement peak demands of the system.” Since there are no Operation and Maintenance criteria given in the *State Primary Drinking Water Regulations*, the inspector may want to conduct a preliminary analysis using the given design criteria. Where available, it is best to use actual flow data taken from meter readings. However, where these numbers are not available, they may be estimated using formulas given in Appendix A.

Also, a history of marked drops in pressure during heavy usage period may indicate that the system is not providing adequate storage to meet the system demands. Often this kind of evaluation requires the use of 24 hr pressure recorders and may not be within the scope of a routine survey. Previous system pressure evaluations and records of recurring low pressure complaints may be the best way to evaluate this item in some instances.

For Hydro-pneumatic Storage

According to design regulations, “For ... ground water systems where the pump yield equals or exceeds the instantaneous demand, the tank shall be sized so the pump cycles a maximum of six (6) times per hour. Where the pump yield is less than the instantaneous demand, the tank shall be sized to provide the difference for a minimum twenty (20) minute demand period based on the actual usable volume of the tank.” Again, since there are no Operation and Maintenance criteria given in the *State Primary Drinking Water Regulations*, it is necessary for the inspector to evaluate qualitative criteria to determine if the system has adequate storage capacity. An indication of insufficient storage capacity is the frequent cycling of the pumps. If the pumps are cycling often, and it is determined that all the equipment is operating properly, then there may be a greater demand on the system than the tanks can supply.

Evaluation Criteria:

- (N) A rating of Not Applicable should be given for this item to a master metered system which does not provide storage.
- (S) A Satisfactory rating should be given if adequate storage is provided based on the criteria given.
- (I) A Needs Improvement rating should not be given for this item.
- (U) An Unsatisfactory rating should be given if the water system has had low pressures due to lack of storage or low water levels.

References:

R.61-58.4 C (1) (a): (Design Criteria)

R.61-58.4 C (3): (Design Criteria)

R.61-58.4 C (4): (Design Criteria)

R.61-58.4 C (5): (Design Criteria)

R.61-58.4 C (5) (b): (Design Criteria)

R.61-58.7 D (12) (Operation and Maintenance Criteria)

24. SANITARY PROTECTION

Purpose:

The purpose of this item is to ensure that all finished water storage tanks are properly protected against contamination.

Inspection Guidelines:

All opening which could potentially allow access to water contained in a finished water storage tank must be properly screened or sealed to prevent the entrance of insects, birds or other small animals. This item is especially important since no subsequent treatment is often provided. Due to the fact that properly operated pressure tanks are always under positive pressure and therefore not susceptible to the introduction of contamination from outside sources, this item generally applies only to atmospheric tanks.

When inspecting atmospheric storage tanks, the inspector should locate the overflow discharge pipe and verify that it is protected by a counter-weight flapper check or an insect screen. If a screen is used to protect the discharge pipe, then it should be in good condition and be securely attached. When a flapper check is used, it should seat securely against the discharge pipe to form a reasonably tight seal when water is not being discharged. An overflow pipe should not discharge directly into a sanitary sewer or storm drain.

Since climbing of elevated storage tanks by Department personnel is not practiced, the inspector should ask for documentation that the vent screen and access hatch have been checked to ensure that they are in tact and locked respectively. Documentation may include photographs of these openings or a signed inspection report or invoice from a tank maintenance contractor. These inspections should be conducted annually. Another common area of concern is the point at which the level indicator enters the storage tank.

For atmospheric ground storage tanks, the inspector should inspect the entire perimeter of the tank to ensure that all openings are properly sealed. In addition, the inspector should either inspect the vent screens and access hatches or ask for documentation that they have been inspected by the system.

Evaluation Criteria:

- (N) A rating of Not Applicable should be given for this item to a master metered system which does not provide storage or systems with only pressure storage tanks.

- (S) If all storage tanks have proper overflow protection, maintain documentation of annual inspections of all access hatches and vents and have no other unprotected openings, then a rating of **Satisfactory** should be given.
- (I) If all required sanitary protection measures are in place, but have not been properly maintained (i.e. screens are torn or have fallen off), then a **Needs Improvement** rating should be given. A **Needs Improvement** rating may also be given if system conducts annual inspections, but fails to maintain documentation.
- (U) If the system fails to provide proper sanitary protection of its storage tanks, then an **Unsatisfactory Rating** should be given. An **Unsatisfactory** rating may also be given if no action has been taken to correct a rating of **Needs Improvement** given in a previous survey.

References:

R.61-58.4 C (2) (c): (Design Criteria)

R.61-58.4 C (2) (g) (iii): (Design Criteria)

R.61-58.4 C (2) (K): (Design Criteria)

R.61-58.7 E (5): (Operation and Maintenance Criteria)

R.61-58.7 E (6): (Operation and Maintenance Criteria)

25. SECURITY

Purpose:

The purpose of this item is to ensure that all finished water storage facilities are properly protected against contamination due to vandalism, tampering and/or sabotage.

Inspection Guidelines:

All storage tanks must be secured against entrance by unauthorized personnel. The introduction of a contaminant at this stage, either accidentally or purposefully, could prove devastating to the water system since subsequent treatment is usually not provided. All access to the area surrounding a finished water storage tank should be restricted to the highest degree possible. All hatches should be locked as well as the perimeter fence gate. All elevated tanks should be equipped with an anti-climb device or should have at least one ten (10) foot section of ladder removed.

If the storage tank is located in a well populated area where tampering would not likely occur without being observed, then the inspector may decide that a perimeter fence is not required. Where a perimeter fence is provided, a minimum six (6) foot chain link fence with barbed-wire capping is preferred. If a perimeter fence is not provided, all tank controls, hatches, pits and valves (if not located in valve pits) must remain locked at all times and the access ladder must be equipped with an anti-climb device. The most obvious sign of inadequate security is the presence of recent graffiti or vandalism on or around the storage tank. The inspector should note any signs of recent graffiti or vandalism and should consider it a sign of inadequate security.

Evaluation Criteria:

- (N) A rating of Not Applicable should be given for this item to a master metered system which does not provide storage.
- (S) If all storage tanks are properly protected against vandalism, tampering or sabotage, then a rating of Satisfactory should be given for this item.
- (I) If all necessary security measures are in place, but are poorly maintained (i.e. locks not in locked position, fences in need of repair), then a rating of Needs Improvement should be given.

- (U) If adequate security measures are not provided, or if the inspector observes recent or repeated vandalism, then this item should be rated **Unsatisfactory**. An **Unsatisfactory** rating may also be given if no action has been taken to correct a rating of **Needs Improvement** given in a previous survey.

References:

R.61-58.7 C (17): (Operation and Maintenance Criteria)

26. STORAGE TANK APPURTENANCES

Purpose:

The purpose of this item is to ensure that the equipment necessary for the proper operation of a storage tank is present and in working order.

Inspection Guidelines:

Storage tanks can be divided into two primary categories: 1) hydro-pneumatic storage vessels, which use compressed air to maintain water pressure and 2) atmospheric storage vessels, which either use elevation to maintain water pressure or simply store water that is later pumped into the system. Refer to the typical drawings in Appendix B for further detail.

All Tanks

Isolation / Bypass

All storage structures must be constructed so that they can be isolated from the distribution system for maintenance and repair. Some tanks are connected to the system by a single pipe that serves as both the inlet and the outlet. The inspector should check to ensure that an isolation valve is installed in the inlet/outlet line and should verify with the system representative that it is operational. For tanks with separate inlet and outlet lines, the inspector should ensure that an isolation valve is installed in each line, and that a bypass is provided so the water flow can be diverted around the tank in the event that it must be taken out of service. Most elevated tanks and all bladder type hydro-pneumatic tanks have a single inlet/outlet pipe; while most ground storage reservoirs, standpipes, clearwells and standard hydro-pneumatic tanks will have a separate inlet and outlet line.

Drains

All tanks must have an adequately sized drain so that the tank can be emptied by means other than the outlet piping to the distribution system. For very small captive air tanks, an isolation valve and spigot may serve as the tank drain.

Sample Tap

A sample tap must be provided on the outlet of all tanks and must be located on the tank side of the isolation valve or on the tank itself. The purpose of the sample tap is to allow water inside the tank to be sampled prior to putting the tank back into service after maintenance or repair. The inspector should make sure that the sample tap is present and is located so that a sample can be readily collected in an ordinary sample bottle.

Atmospheric Storage (Clearwells, Elevated Tanks, Ground Storage and Standpipes)

Overflow

Atmospheric storage tanks must have an overflow to ensure that the water level can not rise above the design level. The end of the pipe should be between twelve (12) and twenty-four (24) inches above the ground surface and should discharge over a drainage structure or a splash pad such that it can be observed from outside the fence.

Special Note: If the end of the overflow is not at an elevation between twelve and twenty-four inches, then the inspector must decide whether or not the current design warrants modification during the next tank maintenance. If the current design is satisfactory in that it can be easily inspected and poses no maintenance or operational problems, then the inspector may decide that modification is not warranted.

Vents

Atmospheric storage tanks must be properly vented in order to keep the structure from imploding in the event of rapid discharge from the tank. The overflow cannot be considered an adequate vent.

Level Indicator/Control

The inspector should ensure that a water level indicator is present and functional. Either electronic telemetry or mechanical float type level indicators may be used.

The inspector should also ensure that the water level can be properly controlled through the use of electronic telemetry, altitude valves or equivalent controls, as necessary. The proper water level must be maintained in each tank without overflow or stagnation of the water under normal operating conditions.

Hydro-pneumatic Storage

Air make-up system

The inspector should look for an air make-up system on all standard hydro-pneumatic tanks. The system will consist of device to put air into the tank, as well as an air volume control valve to expel excess air. Captive air (bladder) tanks do not require an air make-up system. Their air charge is preset and does not come into contact with water inside the tank.

One way to charge a standard hydro-pneumatic tank with air is to install an automatic drain in a section of pipe which opens when the well pump shuts off. Upon pump startup, the automatic drain valve closes, and the air in this section of pipe is forced into the tank to replace air which has been dissolved or lost to leakage. This arrangement is called a snifter or marble valve arrangement.

The other common way to get air into a standard hydro-pneumatic tank is to use an air compressor connected to the tank. The air compressor is typically located within a control building near the tank. It is extremely important that a properly operating pressure relief valve is installed on a tank with an air compressor. Excess pressure can cause a hydro-pneumatic tank to rupture or explode with destructive force. An air compressor is required on hydro-pneumatic tanks 2000 gallons and larger in size.

Pressure gauge

A functional pressure gauge must be provided on all hydro-pneumatic storage tanks. The inspector should ensure that the gauge is operational and that its scale is suitable for normal system pressures, *i.e.* the gauge should not be at its maximum or minimum reading under normal conditions.

Pressure relief valve

The inspector should ensure that all tanks are protected from excess pressure by a pressure relief valve. The pressure relief valve can be located on the well head piping on a single pump system that does not have an air compressor. On tanks with an air compressor, the pressure relief valve must be located on the tank side of the isolation valve(s) or on the tank itself. The pressure relief valve must be capable of discharging water at least as quickly as the pump can fill the tank. If the pressure relief valve seems unusually small for the system (*e.g.*: a one inch pressure relief valve on a tank with a six inch inlet), then the inspector should ensure that the valve is adequately sized.

Pressure switch

If a pump is associated with a hydro-pneumatic tank, a pressure switch for automatically starting and stopping the pump will be found on the piping between the tank and the pump. The inspector should ask what the cut-on/cut-off pressures are and should check to see if the pressure gauge reading is within this range. If the pressure reading is not within the specified range, the pressure switch needs to be adjusted.

Evaluation Criteria:

- (N) A rating of **Not Applicable** should be given for this item to a master metered system which does not provide storage.

All Tanks

- (S) If all of the items in this category are present, operational and in good condition, then a rating of **Satisfactory** should be given.
- (I) If all of the items in this category are present and operational but one or more is not in satisfactory condition, then a rating of **Needs Improvement** should be given.
- (U) If either the bypass, drain or sample tap is not present or is not operational due to lack of maintenance, then a rating of **Unsatisfactory** should be given.

Atmospheric Storage

- (S) If all of the items in this category are present, operational and meet the above guidelines, then a rating of **Satisfactory** needs to be given.
- (I) If all of the items in this category are present, but a flapper or screen is missing, then a rating of **Needs Improvement** should be given. A rating of **Needs Improvement** should also be given if the overflow needs to be modified during the next tank maintenance, but is otherwise satisfactory.
- (U) If any of the above items are not present or not operational then a rating of **Unsatisfactory** should be given. An **Unsatisfactory** rating should also be given if the condition of the overflow or vent is in any way endangering the safety of the public water supply.

Hydro-pneumatic Storage

- (S) If all of the items in this category are present, operational and in good condition, then a rating of Satisfactory should be given.
- (I) If all of the items in this category are present and in good overall condition, but a minor problem exists with a pressure gauge or pressure switch, then a rating of Needs Improvement should be given. For example, if the pressure switch needs adjustment or the pressure gauge appears to have been broken recently, but the system is still operating acceptably, then this rating should be used.
- (U) If one or more of the items in this category is not present, but is required due to the design of the tank, then a rating of Unsatisfactory should be given.

Overall Rating

The overall rating should reflect the lowest rating given for the categories listed above. If an Unsatisfactory rating is warranted for any element listed in the Inspection Guidelines, then the item should be given an overall rating of Unsatisfactory. An Unsatisfactory rating may also be given if no action has been taken to correct a rating of Needs Improvement given in a previous survey.

References:

R.61-58.4 C (1)(b): (Design Criteria) Isolation Valves

R.61-58.4 C (1)(c): (Design Criteria) Level Controls

R.61-58.4 C (2)(f): (Design Criteria) Overflow

R.61-58.4 C (5)(d): (Design Criteria) Hydro-pneumatic Tanks

R.61-58.7 E (3): (Design Criteria) Drain

R.61-58.4 C (5)(d): (Design Criteria) Isolation Valves

27. STORAGE MAINTENANCE

Purpose:

The purpose of this item is to ensure that the water system's storage tanks are properly maintained to guarantee their good working condition.

Inspection Guidelines

The physical appearance of the outside of the storage tank is a good first indicator of proper maintenance. All metal surfaces should be free of rust and should have a consistent, even coating. Rust will usually occur at the welded, or in some cases, riveted seams of the metal panels that form the tank. If the seams show progressive rust, then there is a high probability that the interior of the tank is severely corroded as well. If advanced corrosion of the exterior of the tank is noticed, then the inspector should ask to see the results of the most recent interior inspection. In the case of elevated tanks, the system will usually have an independent company perform all routine tank maintenance. If a tank inspection has been done recently, then the inspector should review the findings and recommendations presented in the inspection report and ask if the water system plans to follow up on those recommendations.

The water system should be reminded that all paint coatings which are applied to surfaces which come into contact with potable water must be certified as meeting the specifications of the American National Standard Institute/National Sanitation Foundation International (ANSI/NSF) Standard 61, Drinking Water System Components - Health Effects. The system must notify the Department, in writing, ten (10) days prior to painting a storage tank.

Where hydro-pneumatic storage tanks are used, the operation of the air make-up system is also of concern. Hydro-pneumatic tanks should have approximately two-thirds water to one-third air ratio if operated properly. The inspector can determine the water level in the tank by touching the side of the tank and noticing where the tank feels cold or shows signs of condensation. There should be a distinct line of separation along the entire length of the tank which indicates the air-water interface. This line should be approximately two-thirds of the way up the tank.

If the air-water interface is obviously less than two-thirds of the way up the tank, then the air volume control valve is likely malfunctioning. If the interface is more than two-thirds of the way up the tank or is not distinguishable, then the tank is probably water-logged. If a tank is water-logged then the pressure will drop significantly when the well pump or booster pump stops. On bladder tanks, a water logged tank usually indicates that the bladder has failed and the tank must be replaced.

Evaluation Criteria:

- (N) A rating of Not Applicable should be given for this item to a master metered system which does not provide storage.
- (S) If all tanks appear to be in good condition and all appurtenances are calibrated and maintained on a routine basis to ensure their proper operation, then this item should receive a Satisfactory rating.
- (I) If it can be verified that all appurtenances are being calibrated and maintained and appear to be in proper working condition but some of the storage tanks show early signs of deterioration or if there is not a routine tank maintenance program, then this item should receive a Needs Improvement rating.
- (U) If several appurtenances are not being calibrated and maintained and as a result are not working properly, if any tank is showing signs of serious deterioration, or if a tank maintenance program does not exist, then this item should receive an Unsatisfactory rating. An Unsatisfactory rating may also be given if no action has been taken to correct a rating of Needs Improvement given in a previous survey.

References:

R.61-58.7 B (2) (b): (Operation and Maintenance Criteria)

R.61-58.7 E (2): (Operation and Maintenance Criteria)

OPERATIONAL CONTROL

28. CERTIFIED OPERATOR/STAFFING**Purpose:**

The purpose of this item is to ensure that all water systems employ the proper grade operator as mandated by the **State Safe Drinking Water Act**, and to ensure that an adequate staff is employed to properly operate and maintain the system.

Inspection Guidelines:Certified Operator

Water systems are grouped by DHEC based upon the system type, number of taps served, and treatment technology. The South Carolina Board of Certification of Environmental System Operators designates the appropriate grade operator for each group of water systems. The inspector must first determine the appropriate system grouping, and then determine the corresponding operator grade. The table below summarizes water system grouping and required operator grade. The inspector should verify that an operator with the appropriate grade inspects the system at appropriate intervals.

SYSTEM DESCRIPTION	Plant Group	Operator Grade
Community serving < 50 taps with no treatment added; Community system which purchases water and adds no treatment; Non-community water supplies which add no treatment	I	None Required
Community water systems serving > 50 taps with no treatment added	II	D
Public water systems that add simple treatment for pH adjustment, disinfection, or control of taste and odor by carbon adsorption	III	D
Public water systems which employ conventional treatment (coagulation, sedimentation, and filtration) for surface or groundwater	IV	C
Public water systems which employ advanced treatment or serve a population > 200,000	V	B or A

Staffing

The inspector must also judge whether the staffing level is adequate to properly monitor, operate, and maintain the water system. This may be determined by evaluating the complexity and overall condition of the system, and system records. A review of operator logs will indicate the frequency of visits. The inspector should verify that a system adding chemical treatment has daily operator visits. Systems which do not add chemical treatment require weekly inspections of the well head piping. A log of these inspections must be maintained and should be reviewed by the inspector. A review of customer complaints may also be helpful. If problems such as line breaks require an unreasonable amount of time to correct, inadequate staffing may be the problem. It is important that a water system be adequately staffed to perform daily operational and preventative maintenance duties, and react in emergency situations.

Evaluation Criteria:

Overall Rating

- (N) A Not Applicable rating should not be given on this item.
- (S) If the water system employs an operator of the appropriate grade and is adequately staffed, then a Satisfactory rating should be given.
- (I) A Needs Improvement rating may be given to a system which employs the appropriate grade operator(s), but needs to be better staffed. The water system should make a commitment to improve staffing in order to be given a Needs Improvement rating.
- (U) If a system does not employ an operator of the appropriate grade, an Unsatisfactory rating should be given and immediate action should be taken to correct this problem. If the system is so severely understaffed that water quality is at risk, then an Unsatisfactory rating should be given. An Unsatisfactory rating may also be given if no action has been taken to correct a rating of Needs Improvement given in a previous survey.

References:

R.68-58.7 (D) (2): (Operation and Maintenance)

R.68-58.7 (E) (1): (Operation and Maintenance)

29. TESTING EQUIPMENT

Purpose:

The purpose of this item is to ensure that a water system has adequate instrumentation for testing the parameters necessary to monitor water quality and ensure proper operation.

Inspection Guidelines:

The inspector must determine whether or not a system has the proper test equipment to accurately monitor their system. This will include both bench-top and continuous monitors. If a system is adding chlorine, a method for measuring chlorine residual must be in place or if a system is making a pH adjustment, then a pH meter must be used, etc. All monitoring equipment necessary for process control must be in good condition and give accurate and reliable results. The equipment should be maintained in good physical condition. Fluoride and pH probes should not have chemical residues on them; chlorine test kits should not have stained glassware, etc. Some of the items the inspector should look for would include, proper sample handling, clean glassware, appropriate reagents, calibration records and charts.

Systems treating groundwater using iron removal and/or ion exchange softening are required to have, at a minimum, the capability to monitor free chlorine residual and pH. On a daily basis, the operator of a groundwater treatment plant is required to sample and analyze the finished water from each treatment plant to ensure the treatment plant is functioning properly. Where fluoride is added to the water, tests to determine the fluoride content of the finished water shall be made at least daily by a certified laboratory and recorded on the Monthly Operating Report Form.

Evaluation Criteria:

- (N) A Not Applicable rating may be given for this item if no monitoring or testing equipment is required.
- (S) A Satisfactory rating should be given if the water system conducts the appropriate water quality monitoring and testing using approved standard methods and equipment.
- (I) A Needs Improvement rating should be given if the system conducts the appropriate water quality monitoring and testing using approved standard methods and equipment, but the documentation for equipment calibrations, maintenance, and a standard operating procedure is not complete and the appropriate records are not maintained.

- (U) A **Unsatisfactory** rating should be given if the system does not conduct the appropriate water quality monitoring and testing. An **Unsatisfactory** rating may also be given if no action has been taken to correct a rating of **Needs Improvement** given in a previous survey.

References:

R.61-58.7 B(4): (Operation and Maintenance Criteria)

30. MONITORING/ RECORDS

Purpose:

The purpose of this item is to ensure that the water system is monitoring their treatment process and maintaining records that verify that they are checking equipment operation and drinking water quality on a routine basis.

Inspection Guidelines:

Water systems must keep all appropriate records and make them available for inspection by the Department and the public upon request. Copies of any written reports, summaries, or communications relating to sanitary surveys or operational inspections of the water system must be kept for a minimum of ten (10) years. Records involving a variance or exemption granted to the water system must be kept for a minimum of five (5) years from the expiration date of the variance or exemption. Records of actions taken by the water system to correct any violation of the **State Primary Drinking Water Regulations** must be kept for a minimum of three (3) years after the last corrective action. Records of all chemical measurements and corresponding chemical feed rate calculations must be kept for a minimum of three (3) years. Records of all flow meter and chemical feed pump calibrations must be kept on file for a minimum of three (3) years. Records for all water quality monitoring must be kept for a minimum of three (3) years.

Where treatment is added, the inspector should verify that the water from each treatment process is being sampled and analyzed at least once a day or as often as needed by a certified operator to ensure that the treatment process is functioning properly. If a combined phosphate or poly-phosphate chemical is used, total phosphate residual monitoring may be conducted once every two (2) weeks in lieu of daily monitoring. All monitoring conducted for the purpose of process control must be performed using equipment and methodology acceptable to the Department. All samples analyses which are reported to the Department for compliance purposes must be performed by a certified laboratory.

Evaluation:

- (N) A Not Applicable rating should not be given for this item. However, only the record keeping requirements apply to systems which do not provide treatment.
- (S) If a water system is monitoring equipment operation on a regular basis, sampling in enough locations to adequately judge the effectiveness of the treatment process, and keeping sufficient documentation of these inspections, then this item should receive a Satisfactory rating.

- (I) If a water system is attempting to monitor their treatment process, but the number of inspection locations or the frequency of inspections should be increased, or if a water system's records lack detail and do not allow an outside inspector to properly evaluate the treatment process, then this item should receive an Needs Improvement rating.
- (U) If a water system does not monitor their treatment process for quality control, or does not maintain records, then this item should receive a Unsatisfactory rating. An Unsatisfactory rating may also be given if no action has been taken to correct a rating of Needs Improvement given in a previous survey.

References:

R.61-58.5 CC: (Inorganics and Organics Monitoring Criteria)

R.61-58.7 B (3): (Operation and Maintenance Criteria)

R.61-58.7 B(4)

R.61-58.7 B (5): (Operation and Maintenance Criteria) - Phosphate

R.61-58.7 D (13): (Operation and Maintenance Criteria) - General

R.61-58.7 E (1): (Operation and Maintenance Criteria)

R.61-58.7 D (6): (Operation and Maintenance Criteria)

R.61-58.6 D: (Operation and Maintenance Criteria) - Record Keeping

GENERAL O & M

31. PLANT SECURITY

Purpose:

The purpose of this item is to ensure that proper security precautions are taken at water treatment plants to prevent intentional or accidental contamination or disruption of the public water supply.

Inspection Guidelines:Facility Design

The inspector should look for perimeter fencing, lockable doors, and lockable equipment enclosures when evaluating the adequacy of plant security measures. If a facility does not have one or more of the above items, then the inspector should evaluate the need for modifications to be made. For example, a facility with lockable enclosures protecting all of its outdoor equipment would probably not need to install a perimeter fence as quickly as a facility with exposed pumps and chemical feed equipment. However, the need for adequate security measures should be stressed to all systems.

Security Procedures

The presence of fencing and locks does not, in itself, make a facility adequately secure. The facility's staff must be in the habit of keeping doors and gates locked. The inspector should make note of employee practices while conducting the survey and should ask questions regarding standard security practices.

Another factor to consider when evaluating plant security is the history of incidents at the plant. If a facility does not provide security that meets design standards but has never experienced a problem with plant security, then the inspector may take this into consideration when rating this item. Conversely, if a facility has all of the required items but continues to have security problems, then the inspector should probably recommend that further measures be taken to discourage entrance.

Evaluation Criteria:Overall

- (N) A rating of Not applicable should be given to a system which does not provide treatment or whose treatment facilities are located within the secured wellhead area.
- (S) If the facility has fencing, locks and protective enclosures in place, and takes adequate precautions in keeping doors and gates locked, then a rating of Satisfactory should be given.

- (I) If the facility takes adequate precautions but needs minor improvement in its security procedures or needs to install perimeter fencing, then a rating of Needs Improvement should be given.
- (U) If the facility does not have adequate fencing, locks or protective enclosures in place, or does not take necessary precautions in locking doors and gates, then a rating of Unsatisfactory should be given. An Unsatisfactory rating may also be given if no action has been taken to correct a rating of Needs Improvement given in a previous survey.

References:

R.61-58.7 (B) (18): (Operation and Maintenance Criteria)

32. FACILITY MAINTENANCE

Purpose:

The purpose of this item is to evaluate the overall facility maintenance practices of the water system including all treatment facilities, storage and treatment buildings, and the grounds around those facilities.

Inspection Guidelines:

The water system needs to employ good housekeeping and grounds keeping practices to ensure that all elements of the treatment process are readily accessible for inspection during the sanitary survey. Access to all treatment and storage buildings should not be restricted by overgrown vegetation or the accumulation of non-essential items. The floors of all treatment and storage buildings should be free from clutter and have open pathways to allow access to all areas. The areas around the treatment units should also be free of trip hazards and standing water or other liquids.

The outside areas around the system's facilities, including wells, treatment plants, and storage tanks should be maintained such that access is readily available to all areas around these facilities. Grass should be kept mowed and there should be no cluttering of the area with non-essential items. Not only will good maintenance practices inspire confidence in the overall operation of the system, it will allow the operator to more readily inspect the entire facility and identify potential problem areas before they develop into more serious problems.

Evaluation Criteria:

- (N) A Not Applicable rating should not be used for this item.
- (S) If the system regularly provides good housekeeping and grounds keeping at their well sites, treatment facilities and storage tanks, then a Satisfactory rating should be given for this item.
- (I) If the system facilities and grounds need more regular attention, but are not altogether neglected, then a rating of Needs Improvement may be given.
- (U) If the system's storage or treatment building are neglected or if the grounds around these facilities or the system's storage tanks are not maintained in a neat or orderly manner, then a rating of Unsatisfactory rating should be given. An Unsatisfactory rating may also be given if no action has been taken to correct a rating of Needs Improvement given in a previous survey.

References:

R.61-58.7 B(1): (Operation and Maintenance Criteria)

R.61-58.7 B(7):(Operation and Maintenance Criteria)

R.61-58.7 B(8):(Operation and Maintenance Criteria)

R.61-58.7 B(9):(Operation and Maintenance Criteria)

R.61-58.7 B(10):(Operation and Maintenance Criteria)

R.61-58.7 B(12):(Operation and Maintenance Criteria)

R.61-58.7 B(14):(Operation and Maintenance Criteria)

R.61-58.7 B(17):(Operation and Maintenance Criteria)

R.61-58.7 B(18):(Operation and Maintenance Criteria)

33. SUPPLIES AND SPARE PARTS INVENTORY

Purpose:

The purpose of this item is to ensure that the public water supply is not disrupted due to an inadequate stock of spare parts and supplies.

Inspection Guidelines:

The term “spare parts” refers to equipment specific parts kept on hand for pumps, chemical feeders, analyzers or any other mechanical device which is required for the production of drinking water in compliance with the *State Primary Drinking Water Regulations*. The term “supplies” refers to more general items such as pipe, fittings, glue or other items necessary for the general repair and maintenance of the water system and treatment plant.

Each water system should have the capability of making minor repairs in-house in order to prevent a minor problem from becoming a major disruption of service. For smaller water systems, a few PVC pipe fittings and PVC solvent may be adequate for repairing minor emergencies. For larger water systems, it may be necessary to have a complete stock of pump parts, chemical feeder parts and/or backup units in addition to an assortment of pipe, fittings and other supplies on hand in order to provide an adequate safety factor.

It will be difficult for an inspector to judge the adequacy of spare parts and supplies by simply conducting an inspection of the store room. The inspector should research Department files in order to determine if inadequate spare parts and supplies have been a problem in the past. The inspector will also need to ask questions regarding any equipment that is in need of repair at the time of the survey. If the need for parts can reasonably be predicted and the repairs can be made by system personnel, then the parts should probably be kept on hand.

Chemical feed systems, such as chlorine used for primary disinfection, require backup units to be kept in stock by the water system. For further detail, please refer to the Water Treatment section of this manual.

Some water systems choose not to perform their own routine maintenance. If the water system has a service contract in place with a maintenance contractor, it is reasonable that their own stock of spare parts and supplies will be reduced accordingly. The inspector must decide if the system’s spare parts and supplies are adequate based upon the size of the system, the type of treatment provided and any unique factor that applies to a particular system.

Evaluation Criteria:

- (N) A Not Applicable rating may be given for this item for small systems which do not add treatment and which do not perform their own repairs..
- (S) If the water system appears to have adequate spare parts and supplies in stock to make minor repairs to pumps, chemical feed systems and distribution lines, then a rating of **Satisfactory** should be given.
- (I) If the water system has a reasonable amount of spare parts and supplies on hand, but needs to improve on a few specific areas, then a rating of **Needs Improvement** should be given.
- (U) If the water system keeps no appreciable amount of spare parts and supplies on hand or has a history of service outages due to the lack of parts and supplies needed to make reasonably predictable repairs, then a rating of **Unsatisfactory** should be given. An **Unsatisfactory** rating may also be given if no action has been taken to correct a rating of **Needs Improvement** given in a previous survey.

References:

R.61-58.7 B (7): (Operation and Maintenance Criteria)

R.61-58.7 B (9) (k): (Operation and Maintenance Criteria)

34. WASTE DISPOSAL

Purpose:

The purpose of this item is to confirm that waste handling and disposal practices meet all applicable rules and regulations of the Department. Provisions must be made for proper disposal of water treatment plant waste. In locating waste disposal facilities, due consideration shall be given to preventing potential contamination of the water supply.

Inspection Guidelines:

The inspector must determine what, if any, waste handling and/or waste disposal a facility has. Any discharge to a stream or water of the State requires a NPDES permit. The inspector should check with the district wastewater evaluator to see what records pertain to the facility in question.

The inspector should also determine if the sanitary waste from water treatment plants, pumping station, etc., is receiving proper treatment. Waste from these facilities must be discharged directly to a sanitary sewer system, when feasible, or to an adequate on-site waste treatment facility or septic tank.

The waste from reverse osmosis, ion exchange plants, demineralization plants, etc., may be disposed of by controlled discharge if a NPDES permit has been issued by the Department to the plant. Except when discharging to large waterways, a holding tank of sufficient size shall be provided to allow the brine to be discharged over a twenty-four hour period. Where discharging to a sanitary sewer, a holding tank may be required to prevent the overloading of the sewer and/or interference with the waste treatment process.

Waste filter wash water from iron and manganese removal plants can be disposed of by using sand filters, lagoons, or by discharging to a sanitary sewer. Sand filters and lagoons must have a NPDES permit for any effluent discharges or a proper No Discharge (ND) permit for land applications. Discharge to a community sanitary sewer is acceptable. However, approval of this method will depend on obtaining approval from the owner of the sewage system as well as from the Department before final designs are made. A holding tank must be provided to prevent overloading the sewers.

Evaluation Criteria:

- (N) If no waste handling facilities required, then a Not Applicable rating should be given.
- (S) A Satisfactory rating should be given if all the waste from a water plant is handled in an appropriate manner and the waste handling facilities are operating within any necessary Departmental permits.
- (I) A Needs Improvement rating should be given if proper waste handling facilities are in place but are not being properly operated or maintained.
- (U) An Unsatisfactory rating should be given if the waste is not handled properly and/or the necessary permits have not been obtained or if the permits are being violated. An Unsatisfactory rating may also be given if no action has been taken to correct a rating of Needs Improvement given in a previous survey.

References:

R.61-58.2 (F):

35. PROCEDURES MANUAL

Purpose:

The purpose of this item is to ensure that a water system maintains written procedures for the operation and maintenance of its system.

Evaluation Criteria:

The list below includes all of the information which may be required in a procedures manual:

- Detailed instructions on starting and stopping any treatment plant
- Preventative maintenance procedures and schedules for equipment
- Water quality monitoring records
- Reporting and public notification requirements
- Sampling and analytical procedures for monitoring water quality
- Sample siting plan
- Valve and hydrant maintenance procedures
- Distribution system flushing program
- Disinfection requirements for the repair of wells, tanks, and water lines
- Cross-connection control program
- Leak detection and repair program
- Safety procedures

The information which must be included in the procedures manual varies depending on the system type. The inspector must review the above list and judge which items are applicable based on the complexity and size of the system. It may be helpful to review past sanitary survey reports and look for any problem areas which may point to the need for standard procedures. For example, a small community water system which does not add treatment may need to include only preventative maintenance procedures and schedules for pumps and tanks, reporting and public notification requirements, water quality monitoring records, a sample siting plan, and disinfection procedures. A community system which adds treatment will need to include additional procedures for starting and stopping treatment, sampling and monitoring water quality and for preparing chemical feed solutions. A large public ground water system which adds treatment may require all of the procedures above. The inspector must judge which procedures are applicable to the system being inspected.

Evaluation Criteria:

- (N) This item may be rated **Not Applicable** for very small water systems which do not add treatment and have a limited distribution system.
- (S) A **Satisfactory** rating should be given if all applicable procedures are included in the manual.
- (I) An **Needs Improvement** rating may be given to a system which has a procedures manual that is missing one or more elements.
- (U) An **Unsatisfactory** rating should be given if the system has no procedures for operating and maintaining the system. An **Unsatisfactory** rating may also be given if no action has been taken to correct a rating of **Needs Improvement** given in a previous survey.

References:

R.61-58.7 B (2): (Operation and Maintenance Criteria)

EMERGENCY OPERATION

36. STAND-BY POWER

Purpose:

The purpose of this item is to ensure that the water system has emergency operational capability during electrical power outages.

Inspection Guidelines:

Auxiliary power is strongly recommended for all water systems, but is only required when gravity storage for water systems with 300 or more service connections is less than one-half of the maximum daily demand. The inspector should review Department files and determine if the water system has adequate auxiliary power to support sufficient pumping and treatment capacity or to supplement the existing gravity storage to meet one-half of the maximum daily demand. This auxiliary power requirement may be waived if two (2) or more independent sources from the serving electrical utility are available or if an alternate water source is available via connections with other systems.

Evaluation:

- (N) A Not Applicable rating should be given for this item to a water system which has less than 300 service connections. A Not Applicable rating may also be given to a system which has more than 300 service connections if the equivalent elevated storage is equal to or greater than one-half of the system's maximum daily demand.
- (S) If a water system provides adequate auxiliary power where required, then this item should receive a Satisfactory rating.
- (I) A Needs Improvement rating should not be given for this item.
- (U) If a water system does not provide adequate auxiliary power where needed, then this item should receive a Unsatisfactory rating.

References:

R. 61-58.4 B (1)(I): (Design Criteria)

R.61-58.7 B (14): (Operation and Maintenance Criteria)

37. EMERGENCY OPERATION PLAN

Purpose:

The purpose of this item is to ensure that the public water system has an up-to-date Emergency Preparedness Plan which addresses who to contact and any arrangements that would be necessary in the event that there is an emergency involving the treatment facility, the treatment process, or the distribution system.

Inspection Guidelines:

It is very important that water systems have an up-to-date copy of the Emergency Preparedness Plan at a location that is readily accessible. The Emergency Preparedness Plan should address the critical parts of the water system (e.g., raw water source, treatment, storage, power source, and crucial areas such as hospitals or dialysis centers) and at a minimum, contain the following elements:

- the telephone number of the Department's District office, the Department's Bureau of Water office and the Department' twenty-four (24) hour telephone number;
- the names and telephone numbers of current chemical suppliers;
- the names and telephone numbers of the electric power, natural gas, telephone and cable companies;
- the names and telephone numbers of the potential sources of spare parts, pipe sections and pipe repair parts;
- the names and telephone numbers of contractors to call for making any repairs beyond the capability of the system personnel;
- the names and numbers of well drillers;
- arrangements for obtaining emergency power;
- arrangements for obtaining potable water;
- an up-to-date distribution map showing line sizes, the location of larger valves, fire hydrants, blow-offs, and pumping, storage and treatment facilities;
- Procedures for notifying the public and media including a sample Boil Water Notice and a sample Boil Water Advisory (see appendix E for guidance); and,
- Emergency disinfection procedures for wells, water lines and storage tanks.

In addition to the above list, Emergency Preparedness Plans for community water systems must also include the following:

- the name and telephone numbers of the County Emergency Preparedness representative, the local law enforcement and highway patrol offices, and the local fire department(s) and Emergency Medical Service (EWS);
- the telephone number of the State Emergency Preparedness office;

- the names and telephone numbers of water system personnel who should be notified in the event of an emergency;
- the locations and telephone numbers of primary and secondary command posts that may be utilized in the event of an emergency;
- the names, addresses and telephone numbers of equipment suppliers and contacts for equipment repair, i.e., pump motors, pump shafts, etc.; and,
- a list of any mutual aid agreements among water systems, such as emergency connections, personnel, equipment supplies and chemical supplies.

If a water system is located in a coastal area, it should also include specific emergency procedures to handle hurricanes.

Evaluation Criteria:

- (N) A Not Applicable rating should not be given for this item.
- (S) If a water system has an up-to-date and readily accessible Emergency Preparedness Plan that contains all the pertinent emergency information listed here, then this item should receive a Satisfactory rating.
- (I) If a water system has an Emergency Preparedness Plan that contains all pertinent emergency information but some of the information is out of date or if a water system has unintentionally left out critical information that is not listed here but that the inspector feels is necessary, then this item should receive a Needs Improvement rating.
- (U) If a water system does not have an Emergency Preparedness Plan, if the plan is not readily accessible, if the plan does not include all the items listed here, or it appears that all the operators are not well informed of what actions to take during an emergency situation, then this item should receive an Unsatisfactory rating. An Unsatisfactory rating may also be given if there has been no effort to correct a previous Needs Improvement rating.

References:**R.61-58.8**